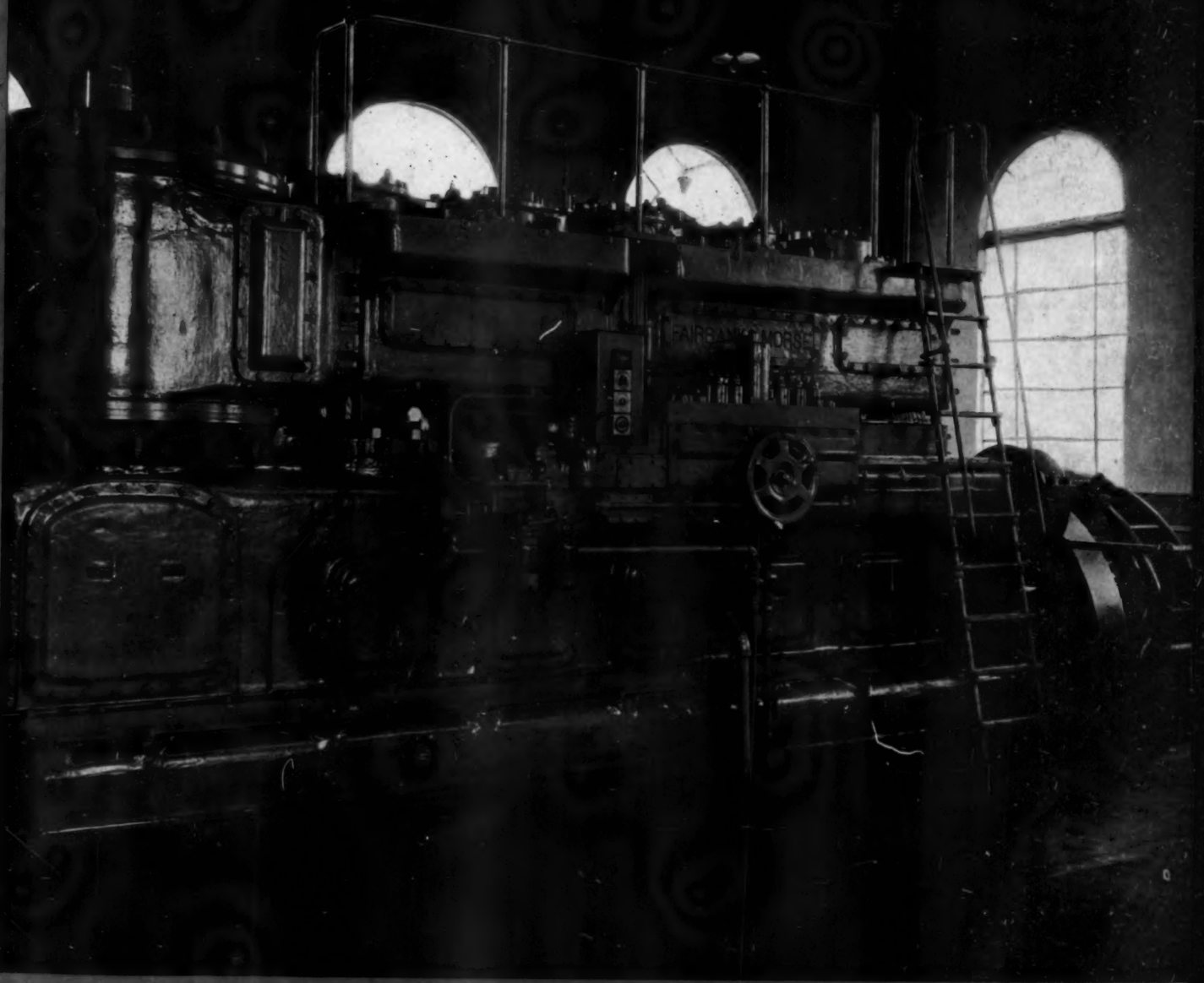
DIESEL PROGRESS

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR



SEPTEMBER, 1935 CIRCULATION OF THIS ISSUE—IN EXCESS OF 10,000 COPIES 25c

THE FOLLOWING MANUFACTURERS HAVE TESTED OR EXAMINED THE QUALITY OILS MANUFACTURED BY GULF FOR DIESEL ENGINE LUBRICATION AND HAVE PRONOUNCED THEM SATISFACTORY FOR THE LUBRICATION OF THEIR DIESEL ENGINES.

GULF

Allis-Chalmers Manufacturing Co.
ANDERSON ENGINE & FOUNDRY COMPANY
ATLAS IMPERIAL DIESEL ENGINE CO.
Benz Diesel
Bethlehem Steel Company
BOLINDERS
BUSCH-SULZER BROS.-DIESEL ENGINE CO.
CATERPILLAR TRACTOR CO.
CHICAGO PNEUMATIC TOOL COMPANY
CLARK BROS. CO.
Colo-Diesel
CONTINENTAL GIN COMPANY
COOPER-BESSEMER CORPORATION
CUMMINS ENGINE COMPANY
DE LA VERGNE ENGINE COMPANY
ELECTRIC BOAT COMPANY
F. A. B. Manufacturing Co.
Fairbanks, Morse & Co.
Foos
FULTON IRON WORKS CO.
HERCULES MOTORS CORPORATION
HILL DIESEL ENGINE COMPANY
Ingersoll-Rand Company
Junkers Corp. of America
Kahlenberg
Kromhaut Diesel Engine Co.
McINTOSH & SEYMOUR CORPORATION

Mianus
Muncie Oil Engine Company
NATIONAL-SUPERIOR COMPANY
NORDBERG,
R. A. Lister & Co. Ltd.
STANDARD MOTOR CONSTRUCTION CO.
STERLING ENGINE COMPANY
STOVER MANUFACTURING & ENGINE CO.
SUN SHIPBUILDING & DRY DOCK CO.
Superior Gas Engine Co.
THE BUCKEYE MACHINE CO.
THE BUDA COMPANY
The Hooven, Owens, Rentschler Co.
THE MICRO CORPORATION
THE OTTO ENGINE WORKS
The Power Manufacturing Co.
The St. Mary's Oil Engine Co.
THE UNION DIESEL ENGINE COMPANY
Tips Engine Works
VENN-SEVERIN MACHINE CO.
Washington Iron Works
Weber Engine Company
WESTINGHOUSE
WINTON ENGINE CORPORATION
Wolverine Motor Works, Inc.
WORTHINGTON PUMP AND MACHINERY CORPORATION

GULF DIESEL ENGINE LUBRICATING OILS

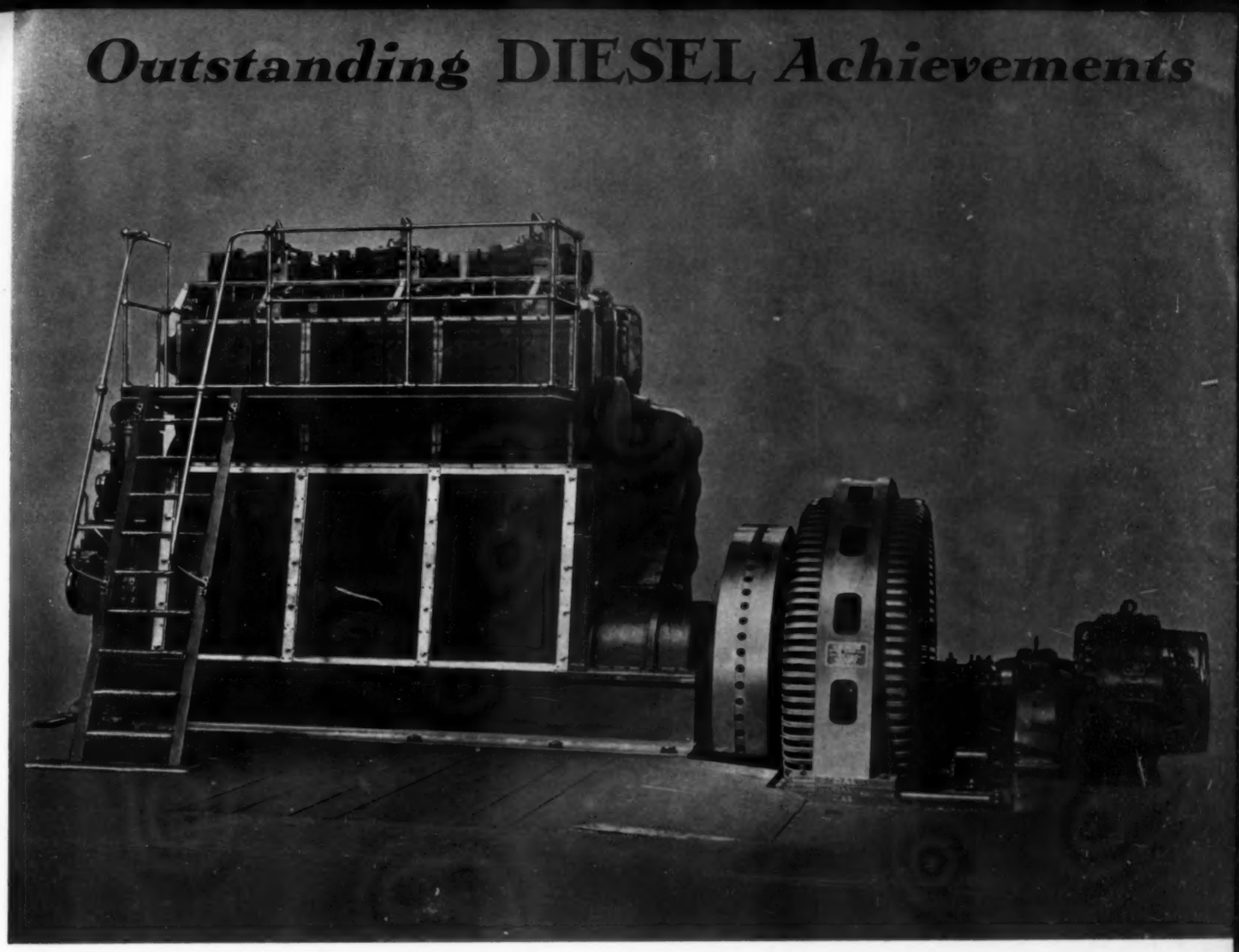
GULF

GULF REFINING COMPANY

District Sales Offices

Boston New York Philadelphia Atlanta New Orleans Houston Pittsburgh Louisville Toledo

Outstanding DIESEL *Achievements*



ILLUSTRATED above is one of three units now under construction in our plant for the Imperial Irrigation District of California, which will install them at Brawley. Eventually this Brawley Diesel plant will be a part of the stand-by service when the All-American Canal, now under construction, is electrified.

Consisting of three, single-acting, trunk piston, three-cylinder HAMILTON-M.A.N. Diesels, 21½" x 27½", running at 240 rpm. and rated at 750 kw., this new Diesel installation in California will rank with the famed Vernon, California, plant in engineering achievement, in interest and in operating economies.

HAMILTON-M.A.N.

THE HOOVEN, OWENS, RENTSCHLER COMPANY

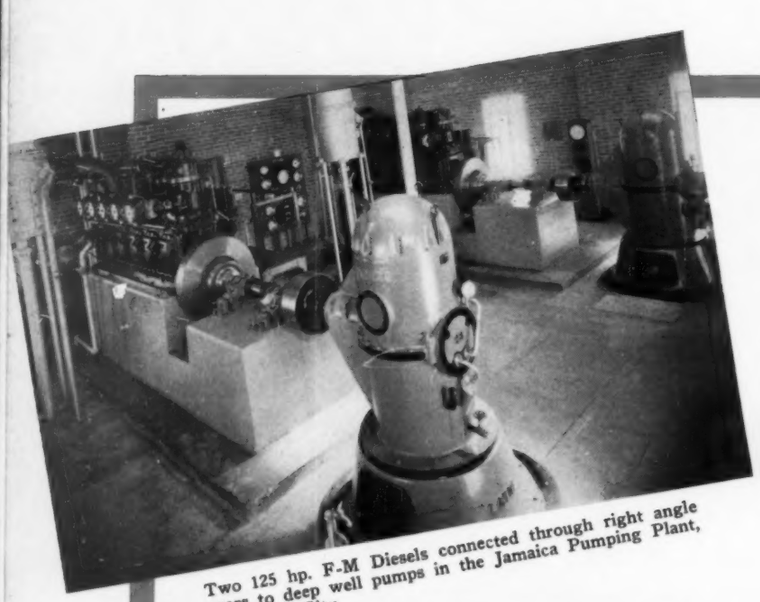
HAMILTON, OHIO

Division General Machinery Corporation

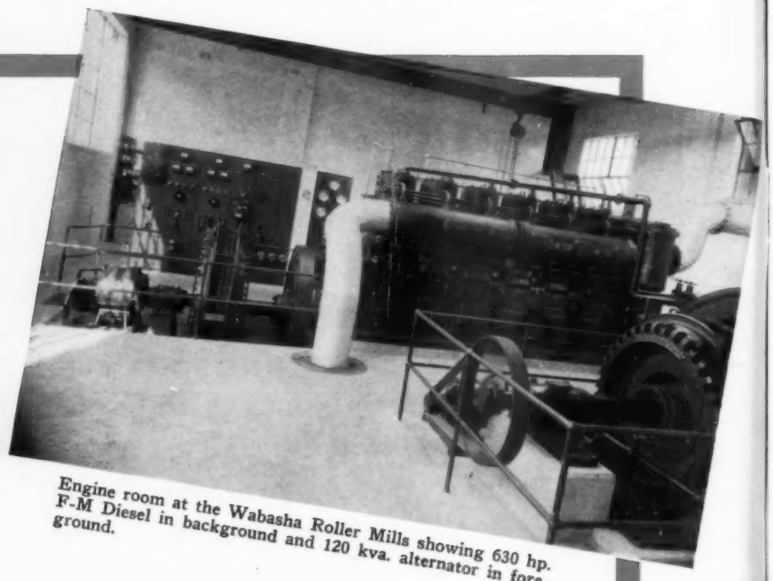
105 YEARS

OF PRECISION MANUFACTURING BEHIND

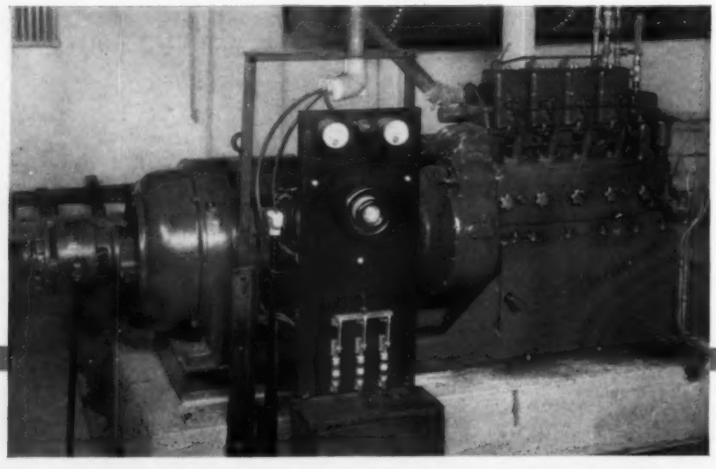
FAIRBANKS-MORSE *Diesels*



Two 125 hp. F-M Diesels connected through right angle gears to deep well pumps in the Jamaica Pumping Plant, New York City.



Engine room at the Wabasha Roller Mills showing 630 hp. F-M Diesel in background and 120 kva. alternator in foreground.



A F-M 4-cylinder, 40 hp. Model 36 Diesel Engine Generating unit supplies power for the Producers Creamery Co. of Olney, Illinois.

NEARLY 3,000,000 HORSEPOWER OF F-M DIESELS GIVING SATISFACTORY SERVICE IN ALL BRANCHES OF COMMERCE

FROM South Africa to Alaska, on land and on sea, in municipal power plants and manufacturing plants, in mines, on ranches and construction projects . . . wherever power is King . . . there you will find Fairbanks-Morse Diesels reducing power costs.

There is one outstanding reason for this preference: The simplicity of the F-M Diesel design and construction.

The F-M two-cycle engines with airless injection eliminate scores of moving parts. The four-cycle and opposed-piston engines are of correspondingly simple, sturdy construction. Controls are centralized; cooling and lubricating systems are arranged to give almost automatic operation.

This simplicity of design plus the most precise and accurate manufacturing methods gives the user of power a new idea of dependability and a new conception of economy in both operation and maintenance.

In addition F-M Diesels are preferred because they are easily operated and maintained by men with a minimum of engineering ability and training; because with 32 branches in the United States and branches in all world seaports F-M service and repair parts are always immediately available; because F-M Diesels possess controlled quality from raw materials to finished product.

Installations Furnish Conclusive Evidence

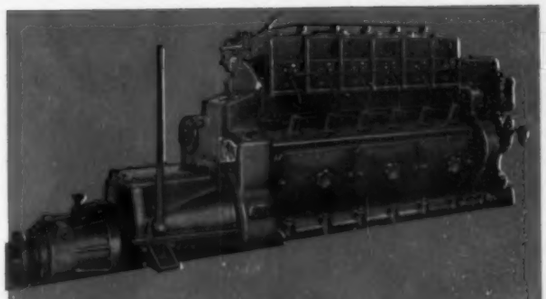
What do these engines do in service, asks the prospective buyer? Fine! Take first municipal power plants. Here there can be no slip-up. People must have light and power. In Kewaunee, Wis., after installing F-M. Diesels, power rates were cut 9% and last year's net profit was $14,114.87. Another: Bloomington, Ill., cut power costs 78% after installing F-M Diesels and today only two cities in the state enjoy lower rates.

Consider, for example, an ice plant. Now steam is used or electric power bought. Investigation will prove that the installation of F-M Diesels will cut power costs from 30% to 50%. The Wabasha Roller Mills with F-M Diesels generates its own power cheaper than it can buy it at a special low rate from the local power company.

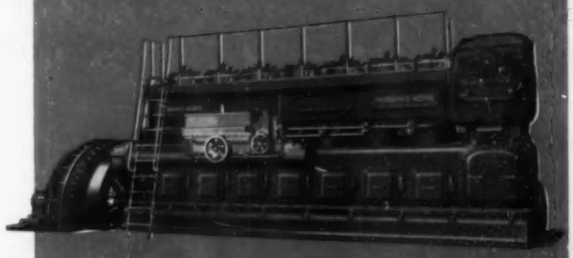
F-M Diesels are now used on Grain Carriers where 120,000 bushel loads are pushed along at 10 miles an hour. They are in use on the tugs of the U. S. Public Health Service, where both speed and dependability are tremendously important.

For Diesels of 10 hp. and up Fairbanks-Morse has a longer and more complete experience to apply Diesel savings to your business.

Information interesting and instructive on all phases of Diesel construction and operation will be sent on request. Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill. Offices in Principal Cities of the United States and Seaports of the World.

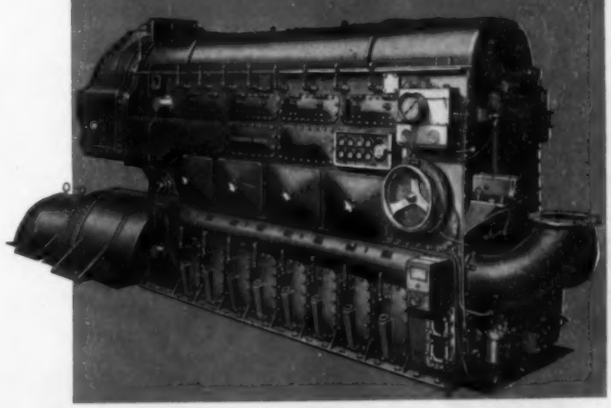


A six-cylinder Model 36, 4-cycle marine engine. Model 36 engines are also available as power units and complete generating units.



A seven-cylinder Model 33 stationary Diesel engine with direct connected alternator for electric power and light service.

An Opposed Piston type of Diesel engine applicable for rail car locomotive service and for stationary power plants.

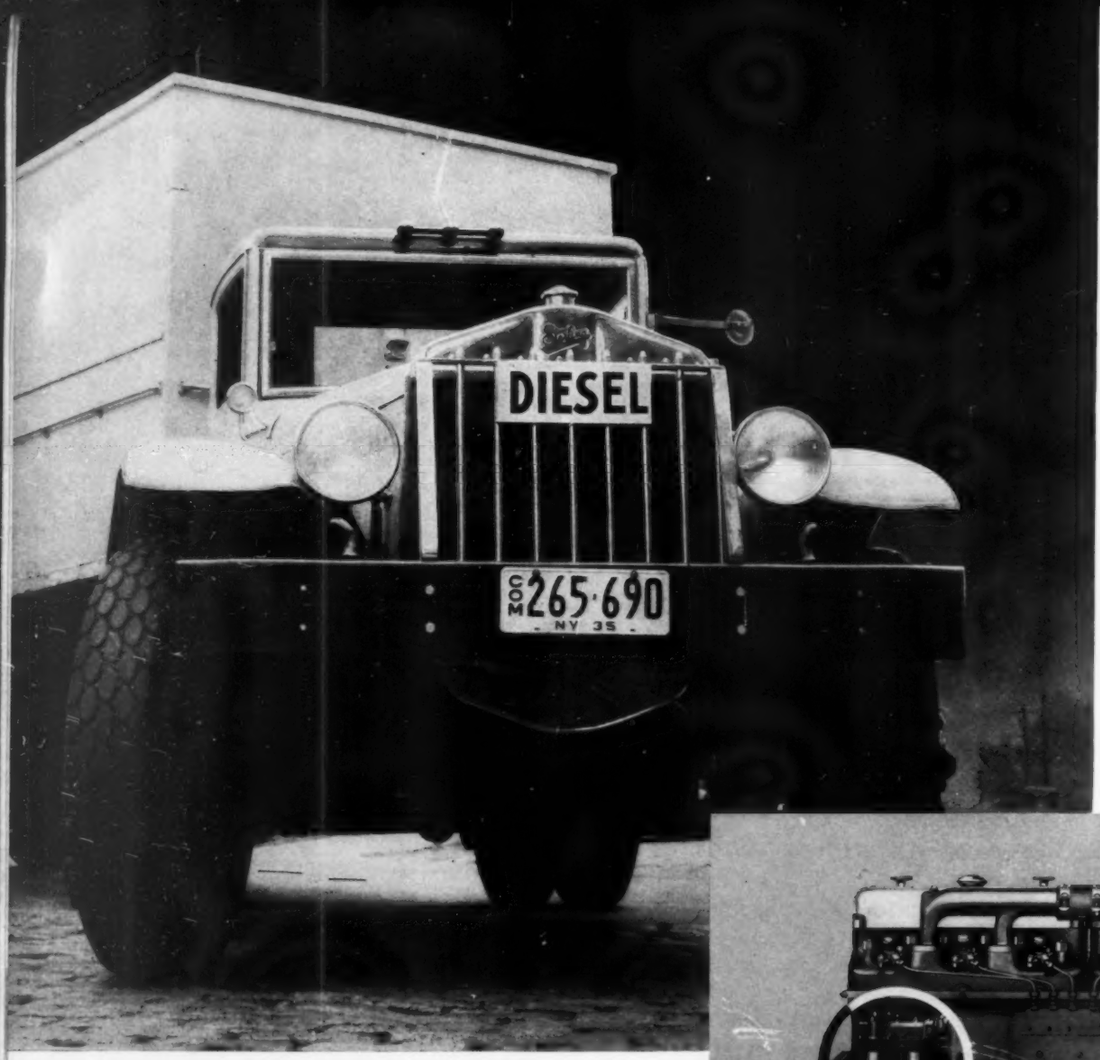


FAIRBANKS-MORSE

Diesels

NEARLY THREE MILLION HORSEPOWER NOW IN SERVICE

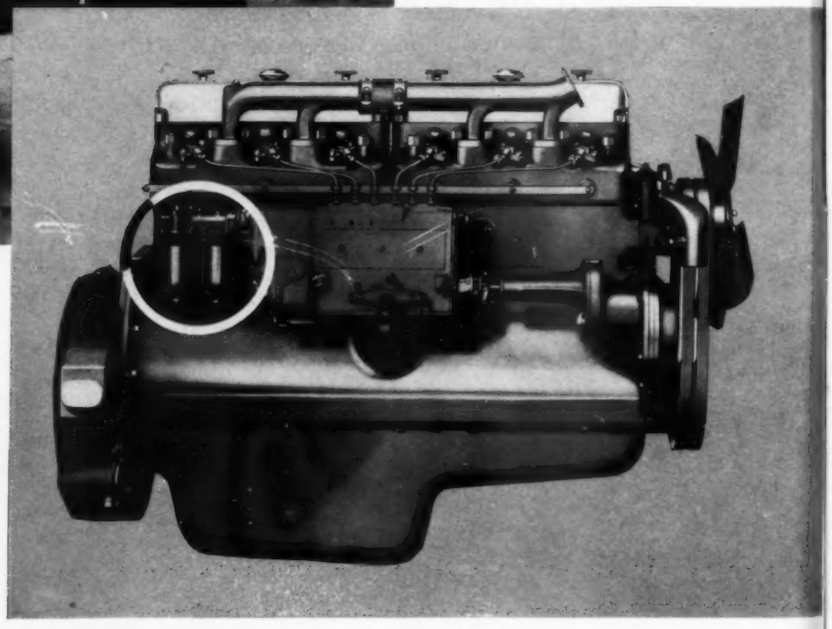
6480—OA97.55



Visit the Purolator Booth, Machine Tool Show, Booth A-402, Cleveland, Ohio, Sept. 10 to 21.

●

Duplex Purolator fuel oil filter on Waukesha Comet Engine—used to drive Sterling trucks.



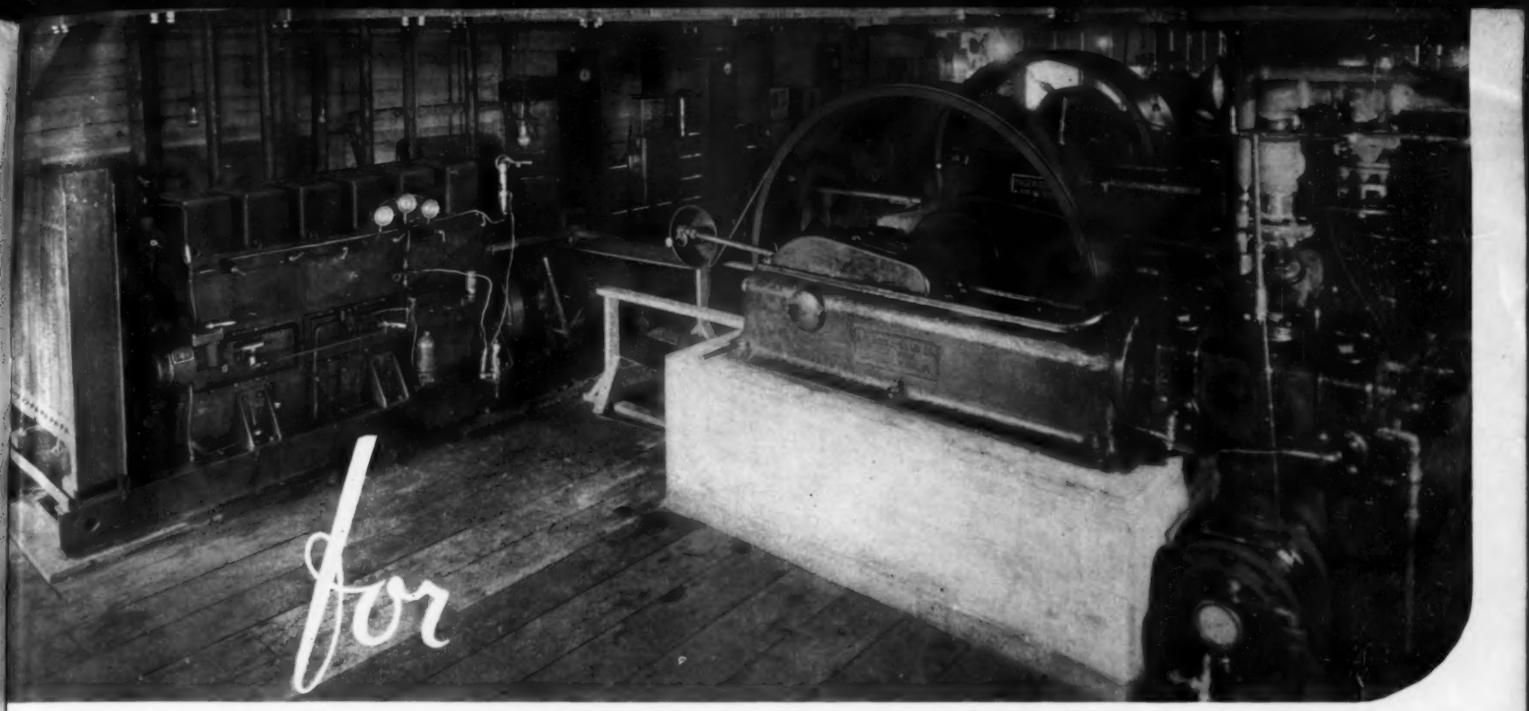
DIESEL DRIVEN PUROLATOR PROTECTED

Diesel Engines have established their usefulness and economy in almost every field where motive power is essential. And for every type of Diesel in use, there is a Purolator Oil Filter, thoroughly tested and approved for its protection to the lube and fuel oil supply.

The Purolator engineering staff is an outstanding authority in matters of oil filtration... and is at your service, always. Motor Improvements, Inc., Newark, New Jersey, Makers of

PUROLATOR

The Oil Filter



TOUGH JOBS
Contractors buy
ATLAS DIESELS!

When contractors are up against a construction job that is really tough . . . . where the profit or loss on the project may be determined by the ability of their equipment to withstand a beating . . . . that is when they turn with confidence to **ATLAS DIESELS**.

Among the tough jobs of the century is the construction of Bonneville Dam on the Columbia River. Here again **ATLAS DIESELS** have come through with flying colors. Pictured here are two of the Diesel applications employed by the Guy F. Atkinson Company, in the construction of Bonneville Dam.

The picture above shows an **ATLAS DIESEL** power unit driving an air compressor which furnished the air for the rock drills. They had to have a dependable air supply . . . . failure means cessation of blasting and a complete and expensive shutdown. The drill runners worked day and night . . . . the **ATLAS DIESEL** had to operate continuously to keep the drills humming. It did the job well.

At the right is a Bucyrus shovel, powered by an **ATLAS DIESEL** and working on the toughest shovel job on the entire project. It was chosen for this job because it never broke down and had plenty of reserve power. Note in the picture that it is handling boulders far too large to go through the dipper. They are picked up and placed on trucks by dumping them over the teeth.

When you want a Diesel for an industrial, stationary or marine application buy an engine that can "take it" . . . . buy an **ATLAS DIESEL**.

ATLAS IMPERIAL DIESEL ENGINE CO.
OAKLAND, CALIFORNIA ◆ MATTOON, ILLINOIS

ATLAS IMPERIAL

A NEW SIZE DIESEL *from the Shop of* BUDA

THE ever increasing popularity of Buda Diesel Engines made this new Buda Model necessary. It is an answer to the demand of boat owners and boat builders for a greater range of horsepower with Buda advantages.

The 6-DM-468 has a 4¼ in. bore and a 5½ in. stroke and develops 100 h.p. at 2000 r.p.m. and 86 h.p. at 1600 r.p.m.

It solves the power problems of those who require more horsepower than the well known 6-DM-415 Buda Diesel Engine but do not need the greater horsepower of the 6-LDM-909.

The new 6-DM-468 brings you all the well known Buda advantages. Like all Buda engines it starts quickly and easily. It runs quietly and smoothly and over long periods of operation has demonstrated its freedom from power loss and temperature troubles.

Like all Buda engines it is provided with the Shock Absorber Head, a feature that alone makes Buda Diesels superior in operation.

Specify a Buda for YOUR Boat.

THE BUDA CO.

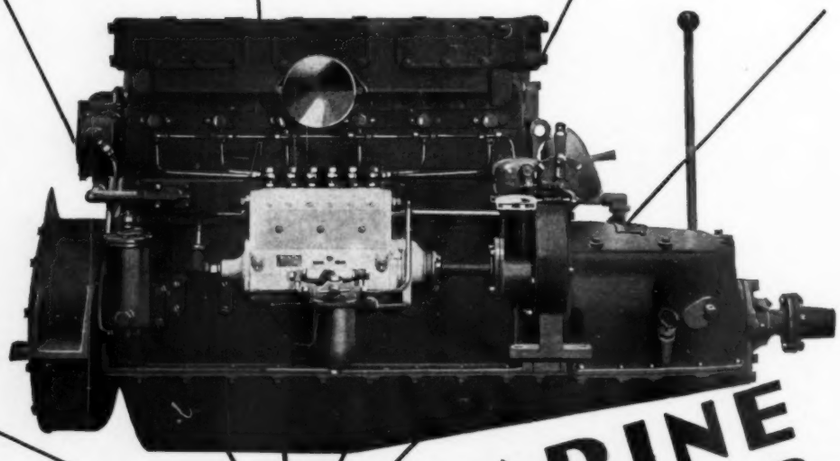
Marine Engine Division K

HARVEY (Chicago Suburb) ILLINOIS

A DIESEL ENGINE FOR EVERY BOAT

4	DM–186	32 H.P.
6	DM–415	85 H.P.
6	DM–468	100 H.P.
6	LDM–909	150 H.P.
6	DM–1611	170 H.P.
6	DM–1742	180 H.P.

Gasoline Engines from 22 to 125 H.P.



THERE'S NO SUBSTITUTE FOR ACCURACY

BUDA MARINE ENGINES

THE BUDA CO.
Harvey, Illinois

Please, without any obligation on my part, furnish me complete information on Buda Engines.

Name .....

Address .....

Town ..... *State* .....

DIESEL PROGRESS

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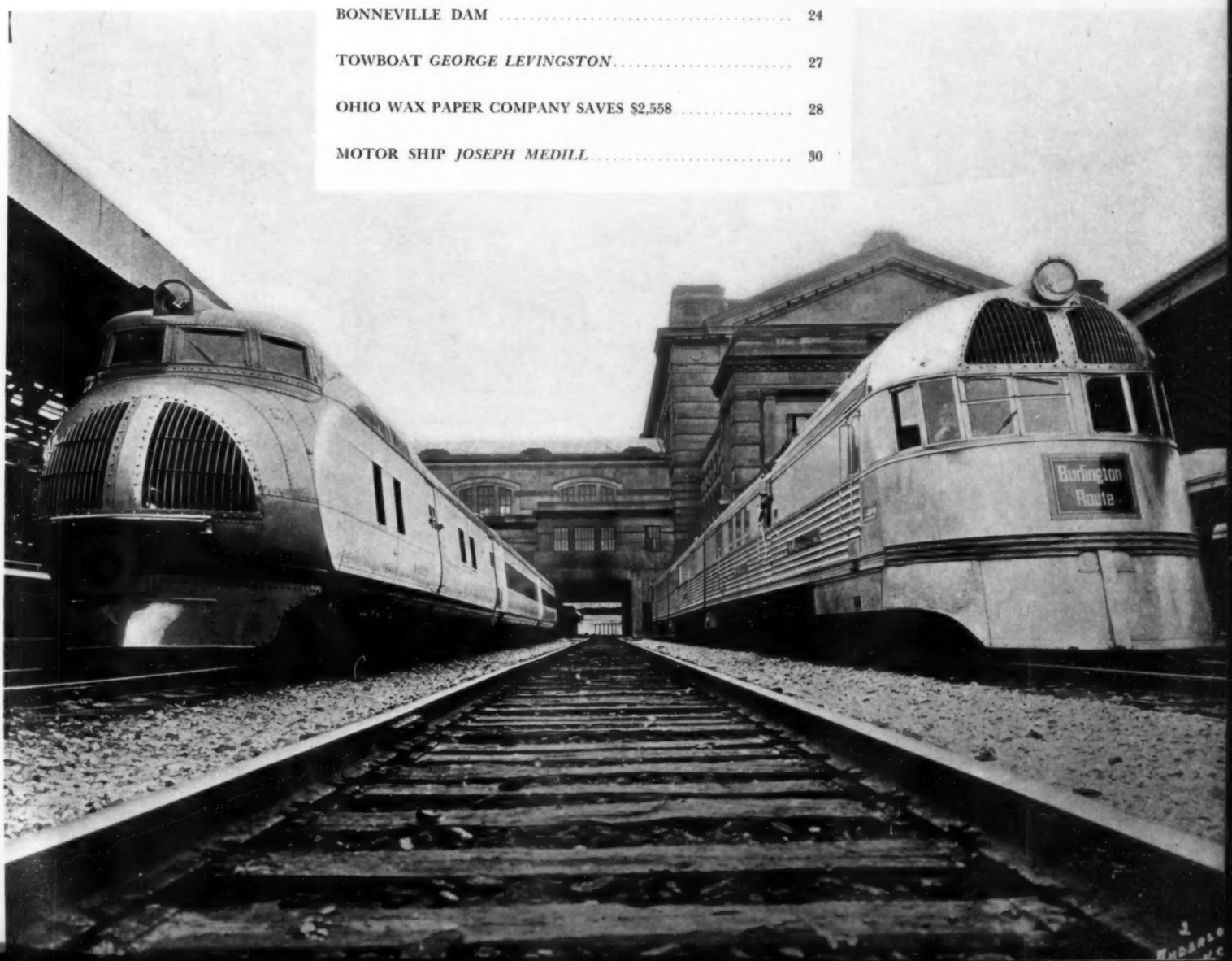
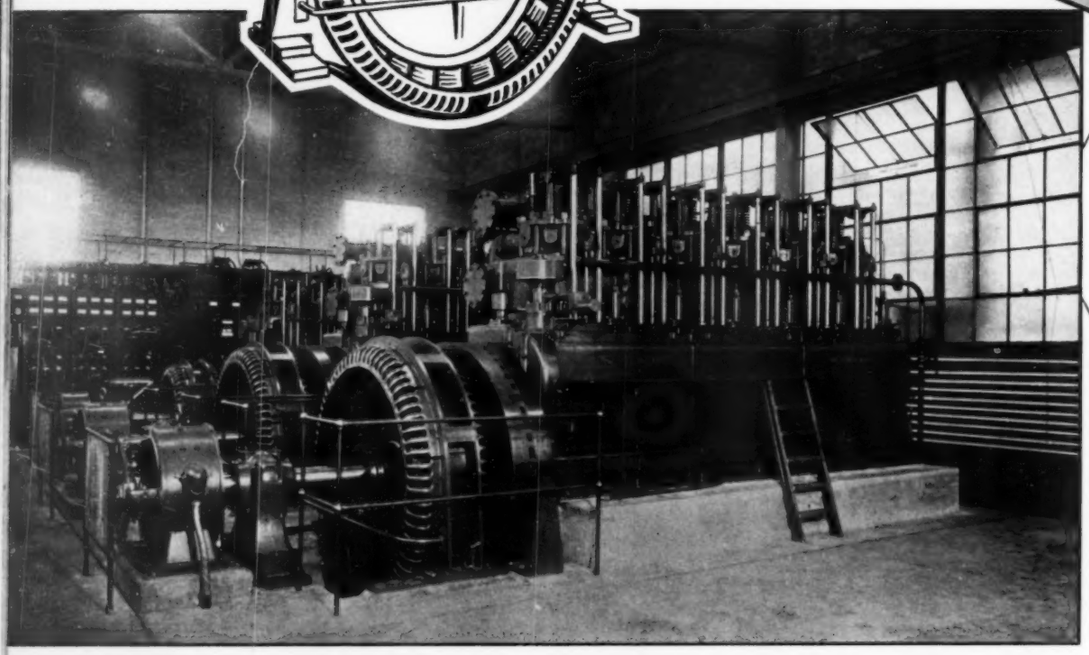
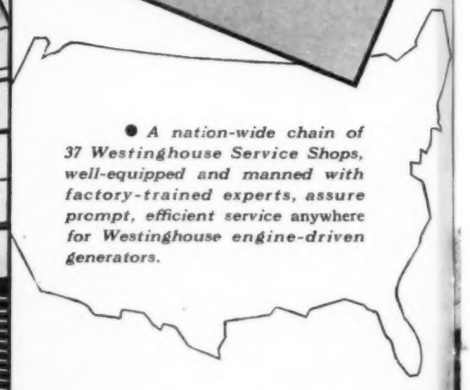


Check the
EXTRA VALUES
you get by Specifying
WESTINGHOUSE ENGINE-DRIVEN GENERATORS

OVERNIGHT SERVICE . . . *Anywhere*





● *A nation-wide chain of 37 Westinghouse Service Shops, well-equipped and manned with factory-trained experts, assure prompt, efficient service* anywhere *for Westinghouse engine-driven generators.*

● *City of Bath, N. Y. Two 375 kv-a. and one 250 kv-a. Westinghouse generators driven by Worthington Diesel Engines. In the background is a Westinghouse steel switchboard.*

EXTRA VALUES

- Protection against shutdowns —tests that safeguard against insulation flaws.
- Solid steel rotor that stands the gaff.
- One source for all generator auxiliaries.
- Positive ventilation for cool running—long life.
- High efficiency at all normal speeds.

YES, just as you would expect of any good generator, Westinghouse ES generators are matched to the Diesel engines that drive them. They have long life, high efficiency, effective ventilation . . . all the features that assure continuity of service and minimum maintenance.

But over and above these considerations stand the *extra values* you get from Westinghouse. *Service* is one of these, and a mighty important thing to keep in mind when you buy a Diesel generating plant.

Westinghouse service is always within a few hours' reach. Don't wait 'till something happens to find out what kind of service facilities the manufacturer has. Weigh that in your original decision.

Write or telephone to our nearest office for further information on type ES generators. R-51002

Westinghouse

ENGINE-DRIVEN GENERATORS

W WESTINGHOUSE ELECTRIC

DIESEL PROGRESS

REX W. WADMAN, Editor and Publisher

CONSISTENCY, conformity, habit—call it what you will. More men, more organizations have been wrecked on the shoals and rocks of consistency than probably any other one basic cause.

As capable Diesel salesmen, carrying the gospel of Diesel economy, of Diesel efficiency, go up, down, and across this country, they are constantly confronted with the consistent man who refuses to change because of habit; with the man who refuses to open his mind to new ideas, to new methods.

Surely, during the past five rather terrible years, all of us should have learned that our old methods, our old habits, were frequently responsible for our individual, and often corporate, troubles.

Surely, in the vital necessity of finding ways of decreasing costs, the subject of your power cost is one worthy of serious analyzation. After all is said and done your power cost has probably been the one item in your budget you couldn't cut—it may even have increased. And yet you turn a deaf ear to an intelligent, trained Power Engineer, who comes to you trying earnestly to SAVE YOU MONEY. Consistency or habit becomes very, very expensive sometimes.

And so, in all seriousness, I beg of power users to lend a willing ear, an open mind to the Diesel Salesman. The Diesel Engine is not the answer to all power problems, and the Diesel Salesman is the first to admit this point if your problem cannot be economically solved by a Diesel installation. But in a majority of cases a Diesel installation can be worked out which will save you money and supply you with a consistent, dependable source of power. Lend an ear to the Diesel Salesman, he may not be the answer to a maiden's prayer, but he usually is the answer to a power user's high cost problem.

Rex W. Wadman, Jr.

WOE UNTO THE CONSISTENT MAN!

The virtue in most request is conformity. Self-reliance is its aversion. It loves not realities and creators, but names and customs.

Whoso would be a man must be a non-conformist.

A foolish consistency is the hobgoblin of little minds, adored by little statesmen and philosophers and divines.

—Emerson

MODEL QUARRY IS DIESEL OPERATED

NEW YORK CITY is the world's largest market for crushed stone. In normal times when construction is going ahead, it is a market using from 80,000 to 100,000 cubic yards of aggregates a day. Supplying this market with about 90 per cent of its output is the Hudson River Stone Corporation on the east bank of the Hudson River near Cold Spring, New York, with an estimated output capacity of 500 cubic yards per hour. Diesels furnish every ounce of power used in the drilling, crushing, washing, sorting and conveying of the finished product, consisting of crushed granite for concrete aggregate and railroad ballast.

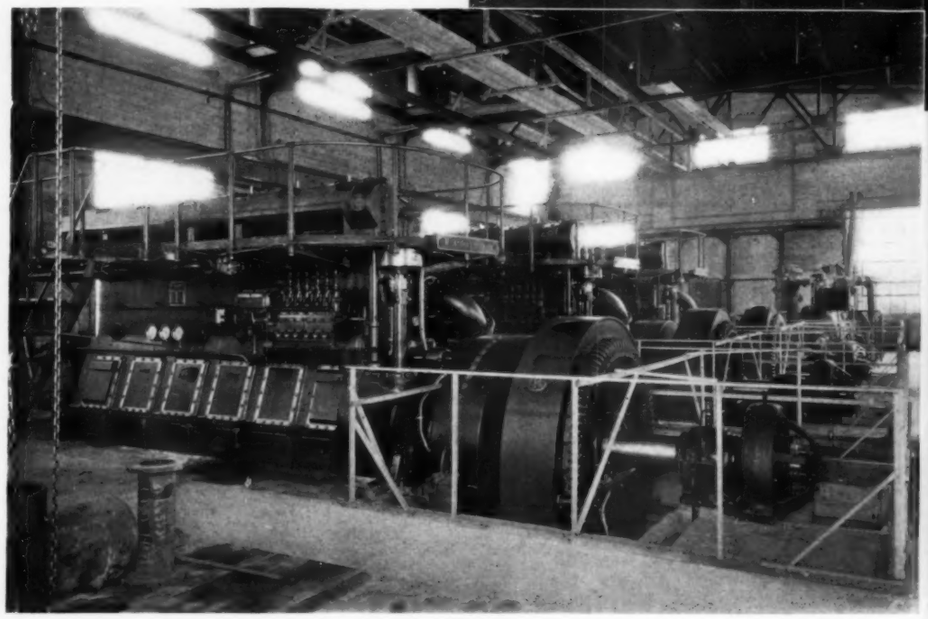
Completed in 1932, the plant of the Hudson River Stone Corporation rates as one of the most complete in the United States. In extent, the property covers about 1,600 acres with a 1,500-foot river frontage. Built to take advantage of its side-hill location, gravity is used wherever possible, in the handling of the rock. The plant is a straight-line layout, stretching down the mountainside for a distance of 2,000 feet from the crusher house to the boat-loading dock. It consists of nine major buildings, all of steel and concrete construction.

Drilling of the rock preparatory to blasting is done by means of well-drills. The quarry floor is 300 feet above the river level and the quarry face extends vertically above the floor. Following the breaking down of this vertical face, the rock is loaded into large auto trucks by means of power shovels. These trucks enter Building No. 1, over a steel-trestle roadway. Air-cylinder hoists with hook dumping rigs tip the loads into a large, heavily-built steel open hopper above and serving a Traylor 72″x 15′ extra heavy steel-link apron feeder.

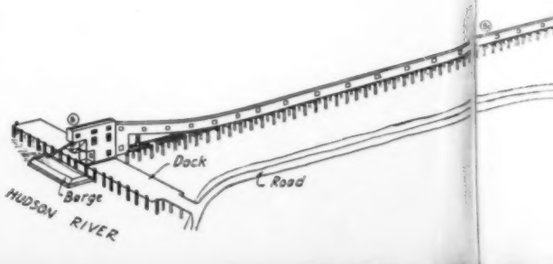
The trucks run from quarry level to the crushing building over a curved runway which allows them to operate on a continuous circuit without interfering with each other.

The apron feeder dumps the quarried stone into a special heavily-constructed 56″x 72″ Traylor Bulldog cast-steel jaw crusher. To withstand the great forces to which it is subjected, the crusher is equipped with manganese steel crushing and cheek plates, and operates with water-cooled bearings. Some of its castings weigh nearly forty tons. This crusher is operated by a 450 hp. motor.

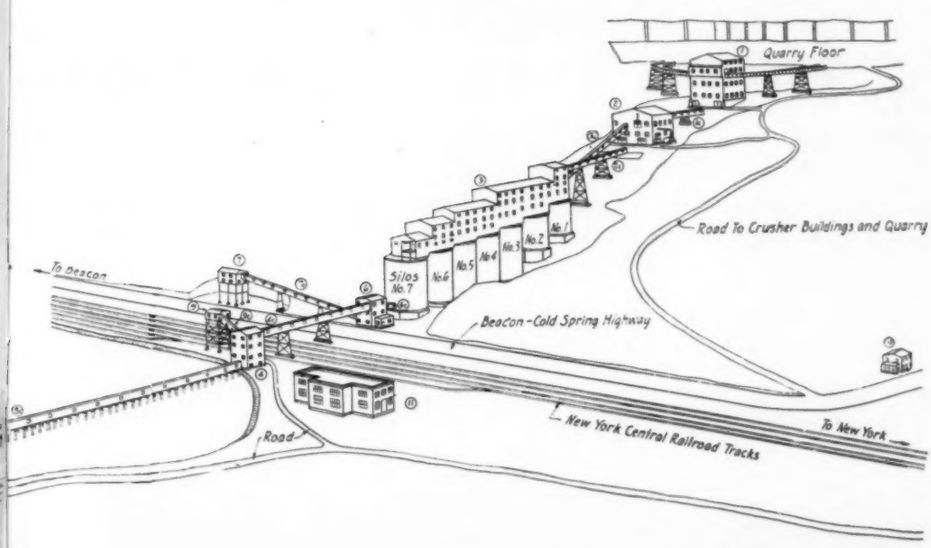
From the primary crusher the broken granite is fed by gravity to a set of two secondary gyratory type crushers. Each of these crushers when running at full capacity, is able to crush 500 tons an hour to a size 3½ inches and under. From the gyratory crushers the crushed stone is carried on a conveyor belt over a steel conveyor gallery into the top of Building No. 2. Here the stone is subjected to washing in order to remove the quarry dirt and the first separation



Interior of the power house, showing the three 660 hp. McIntosh & Seymour Diesel engines and their generators which furnish all the current to run the entire plant.



Aerial view of the Hudson River Stone Corporation near Cold Spring, New York, looking downstream. It is the most completely equipped plant of its kind in the United States. Below — Isometric diagram showing arrangement of units.



LEGEND

1 Primary Crusher Building No. 1
1—72-in. x 15-ft. Apron Feeder
1—56-in. x 72-ft. Jaw Crusher
2—30x25-in. Gyratory Crushers
1—Air Hoist (Truck Dump)
1—25-Ton Crane, Hand Propelled

1e Conveyor Gallery
42-in. Belt Conveyor No. 1

2 Secondary Crusher Building No. 2
2—72-in. x 16-ft. Revolving Screens
3—412 Gyratory Crushers
2—Wash-Boxes

2e Conveyor Gallery
42-in. Belt Conveyor No. 2

3 Screen-House Over Silos—Building No. 3
2—48x108-in. Scalping Screens
14—48x108-in. Double Deck Screens
36-in. Belt Conveyor No. 4
30-in. Belt Conveyor No. 5
30-in. Belt Conveyor No. 6
24-in. Belt Conveyor No. 7
24-in. Belt Conveyor No. 8
24-in. Belt Conveyor No. 9

3e Conveyor Gallery
24-in. Belt Conveyor No. 3 returns from No. 2 Building

4 Wash-House, Building No. 4
2—Wash-Boxes

4e Conveyor Gallery Over Railroad
36-in. Belt Conveyor No. 11

6 Wash-House Building No. 6
1—Wash-Box
1—8-in. Sand Pump

6e Conveyor Gallery
36-in. Belt Conveyor No. 11
24-in. Belt Conveyor No. 12

7 Truck-Loading Silo, Building No. 7

7e Conveyor Gallery
24-in. Belt Conveyor No. 14

8 Barge-Loading Building No. 8
1—8-in. Singe Stage Pump
1—8-in. 2-Stage Pump

8e Conveyor Gallery
36-in. Belt Conveyor No. 13

9 Car-Loading Silo—Building No. 9

9e Conveyor Gallery

10 Office

11 Power House

The huge primary jaw crusher that takes the granite as it comes from the quarry.

A view of the plant looking upstream.

of commercial sizes takes place. This washing and separation is accomplished by means of revolving screens into which streams of water are pumped at a nozzle pressure of approximately 50 pounds per square inch. Stone requiring further reduction in size is then put through a third battery of gyratory crushers located under the revolving screens. After this the stone is conveyed to Building No. 3, situated atop the storage bins, where it is run through a series of sixteen vibrating screens and distributed according to size in seven silo bins. The plant is so designed that production can be geared to turn out specified sizes of ballast or crushed stone, ranging from 2¾″ to ¼″ stone, in any proportion demanded. Should any pieces of larger size run through than can be handled by the screens in Building No. 3, they are automatically rejected and brought back up to the finishing or third battery of crushers mentioned above in Building No. 2, where they are broken up into smaller sizes.

The crushed stone can be loaded by conveyor belts direct from any of the seven silos to trucks for highway shipment, to cars for railroad shipment, or across a third conveyor 700 feet long, running from Building No. 4 to a barge loading building at the end of a dock for shipment by water.

The plant has several outstanding features. The crushed stone is washed both before and after storage. The plant is probably the only commercial crushed stone plant of anywhere near its size to generate its own power with Diesel engines. Practically every piece of moving equipment, including motors, speed reducers, conveyor idlers and pulleys is provided with antifriction bearings. Because of dust conditions in Buildings No. 1 and No. 2, all controls for the motors in these buildings are located in separate dustproof control rooms. All the plant motors

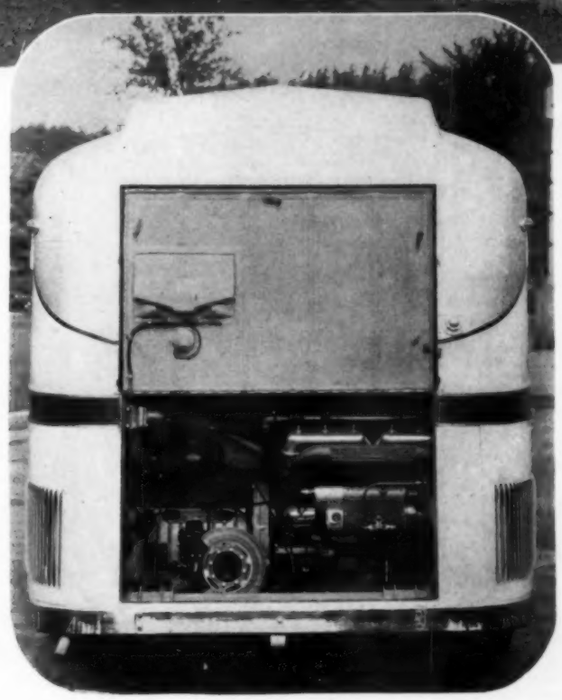
. . . . *And now please turn to page 34*

THE Eastern Massachusetts Street Railway has recently placed in service its first Diesel propelled motor coach, powered with a Hercules Diesel Engine. This Diesel coach is being operated on the Whitman-Brockton-Ashmont terminal route. It has a capacity for 37 passengers and was designed and built by the Twin Coach Corporation.

The Eastern Massachusetts Street Railway is now operating 125 Twin Coach buses and has recently ordered nine more, all of which will be Hercules Diesel powered.

Lower operating costs on all bus lines, both urban and interurban, are now made possible by this latest application of Diesel economy to transportation problems. The use of fuel oil in place of gasoline materially reduces operating costs, not only because the fuel oil costs less per gallon than gasoline, but also because of a much higher operating efficiency which means more miles per gallon.

Our congratulations are extended to the Twin Coach Corporation for being the first manufacturer to offer a standardized line of Diesel buses.



Installation of the Hercules Diesel in the rear end of the Twin-Coach.

TWIN COACH
NOW DIESEL POWERED

A REMARKABLE CONVERSION

Twin Six-Cylinder Diesels Replacing Gas Engines of the Same Rated Power Increase Cruising Speed of 45-Footer Four Miles an Hour

By FRANK M. PRENDERGAST

TWO years ago if anyone told a yachtsman that he could replace two 100-hp. gasoline engines in a 45-foot cruiser with two lightweight Diesel engines of the same horsepower, and get an increase of more than four miles an hour in cruising speed, the yachtsman would have given him a big laugh.

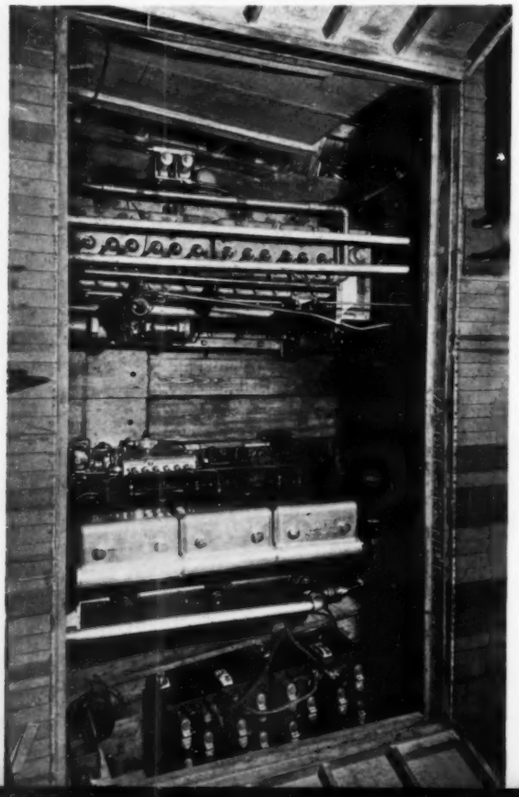
For the last ten years yachtsmen everywhere were being told why this could never be done—given reasons to show it was impossible—the weight factor, lack of flexibility at all speeds, and other objections that would fill a long list.

Now it has been done!

Clarence M. Robinson of Bayside, L. I., who is president of Dawn Cruisers, Inc., owns the *Aldoma*, a 45-foot twin-screw cruiser built at the Dawn Shipyard, Clason Point, New York, in 1929. For the past three years his company has been experimenting with different engines in Dawn 45-foot cruisers to find a suitable model with sufficient power to drive these boats at their proper cruising speed. The quest was unproductive.

The gasoline engines he was using in June were rated at 100 hp. at 1,600 rpm. and gave the *Aldoma* a cruising speed of 11 mph. and a top speed of 13.25 mph. turning twin propellers 22″ x 16″. No amount of coaxing, however, could get them to deliver a speed of greater than 13.25 miles an hour at full throttle. They failed to bring the bow up to its proper planing angle and their fuel consumption for the amount of power delivered was fairly high – 24 gallons an hour at 13.25 mph. Few yacht owners today would be com-

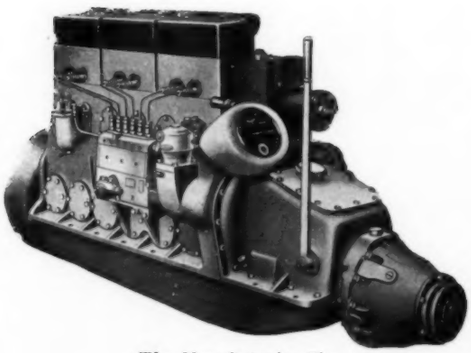
With One Diesel–One Gasoline Engine



With Two Diesel Engines

pletely satisfied with this performance. Neither was Mr. Robinson.

Recently he started investigating Diesels. Finally in July he purchased a pair of right- and left-hand Superior six-cylinder Diesels of approximately the same rated hp. as the gasoline engines. Upon receiving delivery of the first of the two new Diesels he took out one of the gasoline engines and installed it on the same engine bed, no structural changes being needed. Then he went out on trials, with the gasoline engine driving one shaft and the Diesel driving the other. *The results were astounding!*



The New Superior Six-Cylinder 4½" x 5¾" Marine Diesel Engine.

Immediately he got on long distance and called the Otto Engine Works at Holmesburg, Pa., ordering rush shipment of the second Diesel.

With both Diesels installed he discovered that *Aldoma's* cruising speed *had been stepped up from 11 mph. to 15 mph.* and enabled her to reach a *top speed of 16.25 mph.*, which is the fastest the *Aldoma* has ever been driven. It was hard to believe at first.

"Do I like them!" declared Mr. Robinson. "Why these Diesels give the *Aldoma* better performance *in every way* than gasoline engines ever could. Gasoline engines for cruisers will be obsolete in a few years. Say, I had an engineer of a Long Island Sound yacht out in her the other night. When he asked what I had in her for power and I told him Diesels, he just wouldn't believe me. Then I lifted the engine hatch and showed him. He was simply amazed. Everyone I demonstrate them to reacts the same way."

"Yes," continued *Aldoma's* owner, "these two 100 hp. Diesels have any gasoline engines of the same size and rated horsepower, that I've ever seen or operated, licked a mile. Yes, in every way. First, they're quieter and have noticeably less vibration at higher speed. At low speeds I can't see they have any more vibration than a gasoline engine—not these. *They're the easiest-starting engines I have ever seen.* You don't have to warm them up first, either, like you do gasoline engines. They start cold with a touch of the button like this—see?

"And look at that exhaust astern. No heavy smoke. Just like gas engines—clean as a whistle! The engines won't stall on you either. You don't have any priming and choking to do. You throw in your clutch and off you go. The governors hold them steady at any speed you set on the throttles. When you want more speed you just push up the lever. When you want to stop you just shut off the fuel. They idle just like regular gas engines. Another thing—these Diesels are easier to synchronize. There is no spark to adjust."

According to *Aldoma's* owner, the gasoline engines at open throttle burned 24 gallons of fuel an hour at a speed of 13.25 mph. At 15c a gallon the fuel cost was $3.60 an hour or approximately 27½c per mile. The Diesels at full throttle (at a speed of 16.25 mph.) burn 8 gallons an hour. At 6¼c a gallon the fuel cost is 50c an hour or approximately 3c per mile. The Diesels operate at nearly one-tenth the cost of the gasoline engines they replaced. Lubricating oil consumption is about the same.

Here is how the gasoline and the Diesel engines compare, according to the data furnished by their manufacturers:

	Gasoline Engines	*Diesel Engines*
Bore and stroke .	4½" x 5½"	4½" x 5¾"
Overall length to center coupling	68"	67⅞"
Cubic inch displacement . .	524.83	548.7

Furthermore, it has been possible to eliminate the starting batteries with the Diesels. The

32 volt Exide lighting batteries are used for starting the engines. These are kept charged by the Leece Neville generators mounted on the side of the engines.

Aldoma is typically representative of the type of cruiser that finds wide favor with yachtsmen these days. For owner and guest use there are two roomy cabins, completely equipped and arranged so that neither guest nor owner has to pass through the other's cabin. Each is furnished with a private toilet. In spite of her size, she is still able to be classed as a one-man operated boat, though there are accommodations for an extra paid hand if the owner wishes to have a captain-engineer or a deckhand-steward aboard. Provision for such arrangement is made by having a special crew's quarters with a separate toilet, located in the bow of the boat just aft of the peak locker.

The bridge deck, reached through a companionway, is fully enclosed and screened. All engine room controls are centralized at the helmsman's position and all instruments are mounted under glass in a special panel. Directly beneath the bridge deck is the engine room, whose motors are readily accessible through four large hinged hatches. In the after end of the bridge deck are two comfortable cushioned seats.

The stairs from the bridge deck lead through a passage to the owner's cabin. On one side of this passage is a galley and on the other a toilet. The galley is a real kitchen with a deck-filling icebox holding 250 pounds of ice, a gas stove with three burners, an oven and a broiler, shelves and storage space for food and dishes, and a sink, drainboard and running water.

The two Superior Diesel engines installed in the *Aldoma* are of the new design exhibited by the Otto Engine Works division of the National Superior Company at the Motor Boat Show last January and which caused so much favorable comment at that time.

Six-cylinder, 4½" x 5¾", four-cycle, conservatively rated at 85-100 hp. at 1,600 rpm. based on a 75-85 lbs. bmep., this new engine is a credit to its builders, the Otto Engine Works.

This line of engines comprises three models in two, four and six cylinder sizes with 4½" bore and 5¾" stroke. They are of the four cycle, cold starting, solid injection type. Horsepower ratings are based on 75 to 85 lbs. bmep., insuring not only continuous and dependable power over long periods, but also smooth and quiet

"Aldoma's" Owner, Clarence M. Robinson.

operation, lower heat stresses, moderate cylinder and bearing pressures, long life, lower maintenance costs, low lubricating oil consumption, maximum flexibility and large overload capacities for emergencies.

The average compression pressure in these new engines is 380 pounds per square inch, while firing pressures do not exceed 650 pounds at rated load and speed. The low maximum pressures and terminal temperatures insure long life of cylinders, valves and seats. Being a full Diesel, ignition is accomplished solely by heat of compression.

Fuel oil consumption ranges between .40 and .45 pounds per brake horse power hour per hour, depending on load and speed characteristics. Lubricating oil consumption is approximately one gallon per 3,000 hp. hours.

The standard equipment on this line of engines is very complete, the main units being Bosch fuel pumps, Bosch starting equipment; Purolator filters on the fuel line; Cuno filters on the lube line; Pierce Governors to handle the very efficient governing so noticeable in the operation of the engines on the *Aldoma*. Snow & Petrelli supply the reverse gear.

As stated above, this same engine is manufactured in a two-cylinder unit, with reverse gear, rated at 24.4 hp. normal rating and 28.8 hp. maximum rating. Then the next unit is a four cylinder, 365.8 cu. in. rated at 52.8 hp. at 1,500 rpm. normal and 62.2 hp. maximum, likewise at 1,500 rpm. The six-cylinder unit, illustrated in this article, is normally rated at 85.2 hp. at 1,600 rpm. with a maximum rating of 100.2 horsepower.

And, of course, this same general design is available for industrial services, such as generator drive, pump drive, irrigation work and the hundred and one services to which an efficient, high-speed Diesel engine can be put today. The industrial engine is rated at 10 kw. to 15 kw. in the two-cylinder size, 20 kw. to 25 kw. in the four-cylinder size and 30 kw. to 50 kw. in the six-cylinder size. In our next – October issue – we expect to have an extremely interesting application of the six-cylinder Superior high-speed Diesel engine, direct connected to a Crocker-Wheeler generator, installed in a garage and service station. The installation of this Diesel unit has made possible the doubling of his volume for the far-sighted owner who made the necessary investment and took the chance of increasing his business and his profits.

Designed and built primarily to be a long lived engine, its design and construction typify the advance in the art of high speed Diesel development. For here is a Diesel engine capable of being installed in same space as a similar powered gasoline engine, as quiet if not quieter than a gasoline engine and as vibrationless.

Ruggedly simple—these two words fully characterize this new light weight Diesel engine. The controlled-turbulence combustion chamber insures a clean exhaust through complete combustion at all operating speeds and loads. The even flow of controlled power through scientifically balanced reciprocating and rotating parts makes for smooth running qualities. Through complete enclosure, highly efficient crankcase ventilation and perfect combustion, this engine is free from objectionable odors of all kinds. And quiet, very quiet, due to controlled combustion, oil cushioned tappet mechanism and silenced air intake-flow. All in all, a very satisfactory and very economical power plant for marine service.

To quote what an authority on yacht engines said about Diesels only a short time ago: "To sum up the yachting requirements, the engine must be small, light, powerful and vibrationless, and it must appeal to the aesthetic tastes of its purchasers. To gain these essential features no sacrifices of dependability, maneuverability, and lasting qualities can be made. In short, the successful yacht Diesel is the aristocrat of Diesels and rightly so."

Well. It seems fairly well established that today's Diesel engine designers are meeting those standards right now.

THE SILVER FLEET DIESELIZES

OPERATING a truck for 425,000 miles is somewhat of a feat in itself, but when the owners decide to install a new Diesel engine and roll this total up to 1,000,000 miles – that's an endurance contest. Yet this is exactly what the operators of the Silver Fleet Motor Express of Louisville, Ky., are out to do and they are firm in their faith that re-powering with a Diesel will make possible this objective.

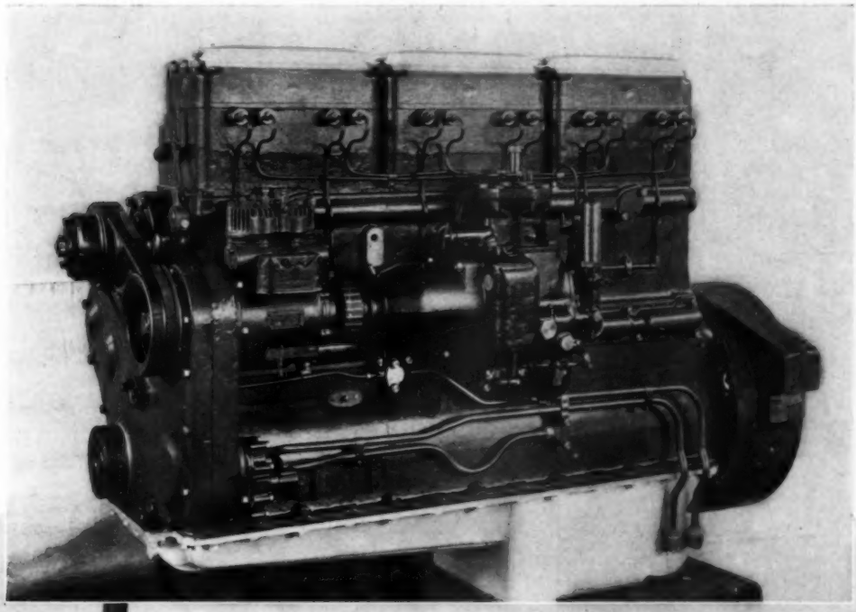
The Silver Fleet Motor Express is one of the largest truck operators in the Middle West. Its fleet, comprising more than 75 units, plies between various southern cities and Chicago. Most of its trucks haul pay loads of 20,000 pounds or more and climb many long hills.

Recently it started to Dieselize its heavier units. The first unit to be re-powered was a Mack BC tractor type truck that had already gone 425,000 miles. The truck is shown below. After rejuvenating its chassis, the company installed a Cummins, six-cylinder Diesel engine in it. With this new engine the truck is now able to carry a pay load in excess of 30,000 pounds. Having long since written off the purchase price of the truck on its books, the company considers itself the owner of a new truck for only the cost of a new engine. And what is more, it has every confidence, judging from recent performance, that re-powering with a Diesel engine will enable the truck to deliver even more mileage than it did with the original gasoline engine.

By the end of a year the company will have completely written off the cost of the new Diesel engines in each of the six trucks now being converted, due to their fuel savings compared with gasoline trucks. And, of course, they will be carrying larger pay loads.

The drivers report that they are able to make better overall time with the Diesel-powered trucks because of their ability to negotiate all grades in one to two high gear ratios, which means they can haul a considerably larger tonnage each year.

Additional units of the Silver Fleet Motor Express are now being converted to Diesel drive as rapidly as the Cummins factory is able to deliver the new motors.

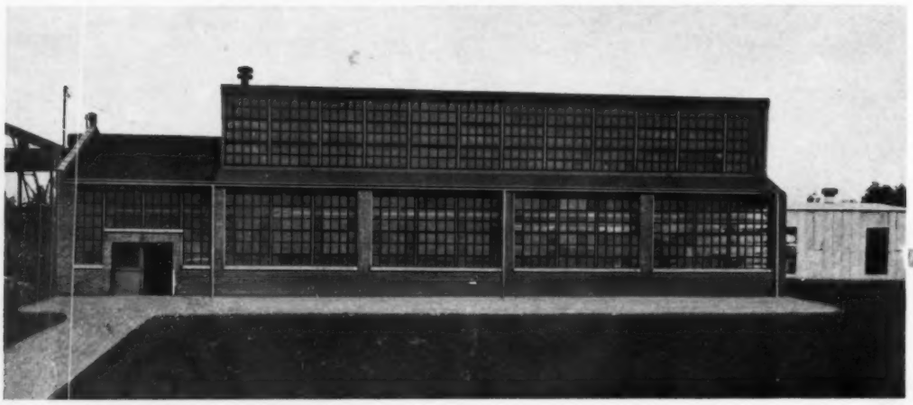


Showing modern Winton-Diesel installed in engine room in new plant

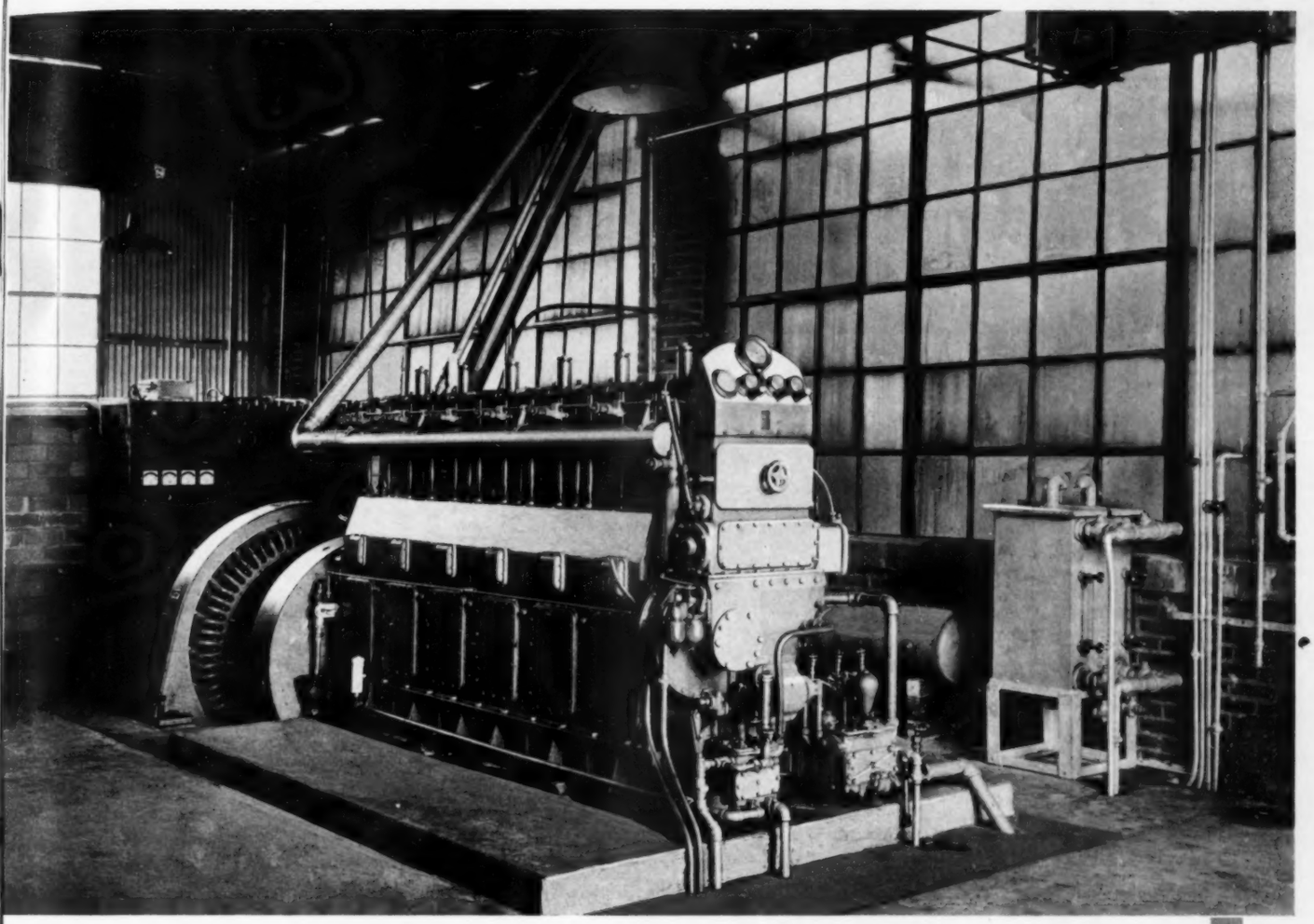
Economical Power!

A WINTON-DIES

The Bowdil Company's new plant, Canton, Ohio



Symbol of Economy and Dependability



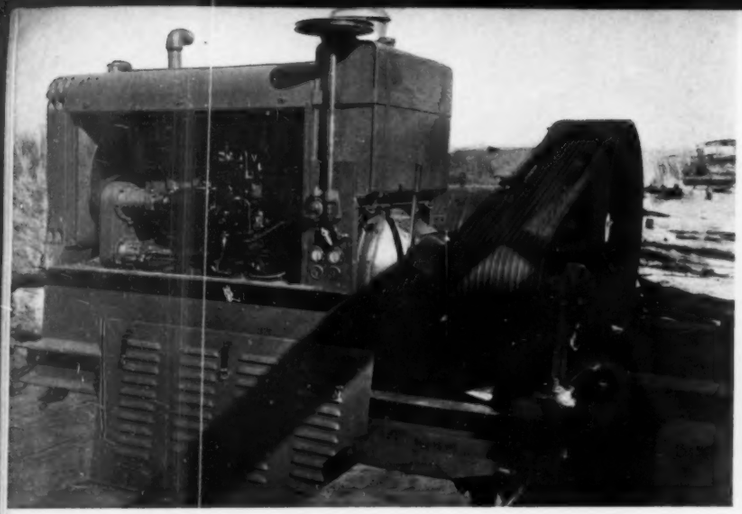
DIESEL ENGINE SOLVED THE PROBLEM FOR THIS OHIO MANUFACTURER

THE Bowdil Company, of Bowdil, Ohio, manufacturers of high-grade alloy steel tools for electrically-driven coal cutting machinery, recently found it necessary, because of their increasing business, to purchase a new factory in Canton, Ohio. In order to insure maximum efficiency and economy in supplying power and light for the new factory, a Winton-Diesel power plant has been installed. The engine is a six-cylinder airless injection unit, 10-inch bore, 14-inch stroke, direct-connected to a 125 k.w. at 360 r.p.m., 220-volt, 60-cycle generator with direct-connected exciter. Service requires 10-hour daily operation of the main engine, which has demonstrated its ability to effect a decided saving in operating cost.

The installation is complete in every respect and provides a most desirable solution to the owner's power and light problem. Equipment includes air compressor, up-to-date instrument and control board, water softening tanks, outside water cooling tank, and a 500-gallon inside tank for supplying hot water to boilers. Regardless of plant size or power requirements, Winton-Diesel engines are ideally adapted to the demands of industry. The success of every Winton installation is insured by correct design, fine workmanship and exceptional research and engineering facilities. A letter outlining your power problem will bring recommendations for its solution through the application of highly efficient Winton-Diesel power.

WINTON ENGINE CORPORATION

CLEVELAND, OHIO, U. S. A.



A Cummins six-cylinder Power Unit in oil well operation driving a National No. 3 rig with rotary attachment. The remote throttle control is in the foreground above the instruments and in the foreground, on the side of the engine, is the Cummins low pressure fuel pump and distributor.

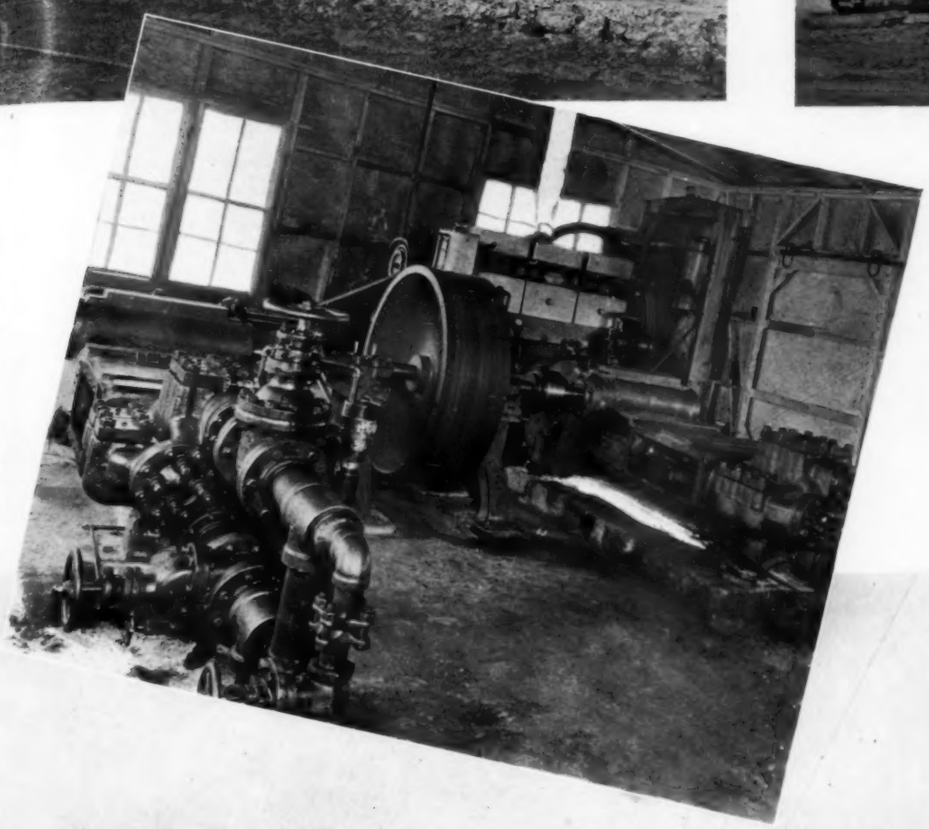
The Yount Lee Oil Co. (just taken over by the Standard of Indiana) use this wide guage Caterpillar Thirty-Five Diesel in derrick construction at High Island, Texas.

The Carter Oil Company of Oklahoma City successfully use this Caterpillar Seventy-Five Diesel tractor in their well pulling operation, pulling between 6,500 and 7,000 feet of tubing in eight hours at a fuel cost of 60c.

W. & E. Production Company, Glasscock County, Texas, use this Cummins Diesel Power Unit to operate a Super "J" Fort Worth Spudder. This unit was deepening a well from 2,205 to 2,255 feet at the time the photo was taken. In drilling, bailing, running 2½-inch tubing and rods in four days, only 24 gallons of fuel oil was required, with no oil or water added.

DIESELS IN THE PETROLEUM INDUSTRY

The mobility, flexibility and economy of the Diesel tractor is well illustrated by this photograph. A Caterpillar Seventy-Five Diesel with a Willamette winch and a boom make easy work of moving heavy machinery to new locations.



On the Slick-Dodd lease in the Oklahoma City field this Caterpillar Seventy-Five Diesel and a Cardwell winch is used to pull and replace 6,800 feet of tubing in eight hours, at a fuel cost of 60c per day.

Top, left — Superior Oil Company, Scott, La., using a Caterpillar Seventy-Five Diesel tractor to transport heavy boilers and other big machinery, supported on LaPlant-Choate oil-field trailers. The tractor is equipped with a boom and a Willamette winch.

Left — In the East Texas field — A Buda six-cylinder, 180 hp. Diesel is successfully and economically used to drive oil pipe line pumps through a Tex-Rope drive.

Phelps Ingersoll, vice-president of Wilcox, Crittenden & Co.

A CONNECTICUT YANKEE ENDORSES DIESELS

TRAVELERS passing through Middletown, Conn., will come upon a sign bearing this legend: "In 1655, a few rods from here, Thomas Miller built the first grist mill in this county for the grinding of corn for the first settlers." A stone's throw distant is another sign on a tree in front of the main office of Wilcox, Crittenden & Company, oldest and largest manufacturer of marine hardware in the United States, which reads:

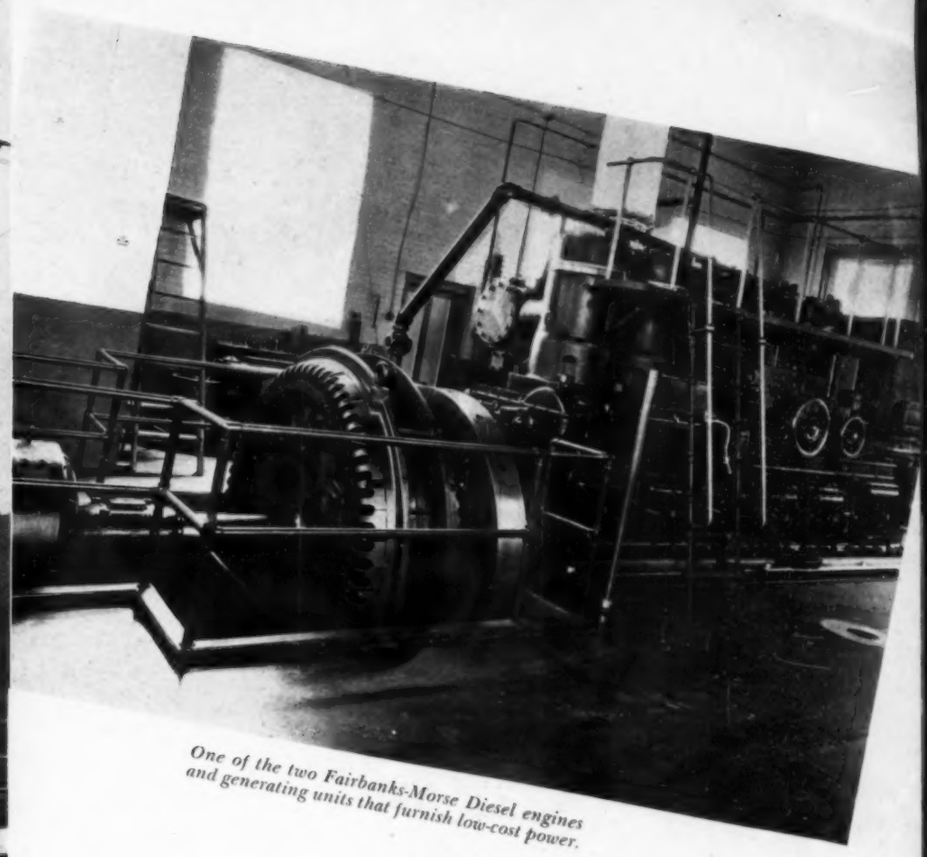
1655 THIS IS THE SITE 1915
OF THE FIRST GRIST MILL IN
MIDDLESEX COUNTY

WE ARE STILL GRINDING AT
THE OLD STAND

After 88 years, Wilcox, Crittenden & Company is still producing its own power, but for the last seven years it has employed Diesels. During 1934 it generated at its Diesel engine power plant, a total of 603,185 kwh. of electricity at a net cost of 1.3 cents a kwh.

Says Phelps Ingersoll, vice-president of the company: "Our Diesel generating plant has given us very material savings, particularly during these recent depression years when our load demand was varying daily and almost hourly. The combination of different engine capacities, plus supplementary water wheel power, has given us a variety of combinations of power source which could take care of, at low cost, any demand we might have when running a combination of any of our five departments, or all of them at one time. We have been very particular at all times to keep costs on our generating plant, and to charge everything possible and proper to the generating power department. We are paying about 1.3 cents a kwh., varying according to the demand, for purchased power. The power company advised us that if we purchased all current used, the rate would be about 2¼ cents, but that it would vary with the demand load."

Four types of prime movers have been used at different times by the Wilcox, Crittenden plant — water power, steam, purchased electricity, and now its own Diesel engines. The first power was furnished by water turbines and rope drives. There was a severe drought some time around 1870 when water in the millstream became so low that supplementary power was necessary. A steam engine was installed some time around



One of the two Fairbanks-Morse Diesel engines and generating units that furnish low-cost power.

this date but its records are lost in antiquity. In 1892 a 75 hp. Fitchburg engine and a Hazelton boiler were installed, followed in 1904 by a 240 hp. Fitchburg Cross Compound engine and a 250 hp. Hazelton Porcupine boiler. The boiler is still in use, but for heating purposes only.

In 1908 a 244 hp. Ames Tandem Compound engine was installed, and was used until 1928, when a new power house was built and a first Diesel placed in service. From about 1900 until 1920 purchased electricity was used for night lights and night operations, and for off-working periods. In 1920 the demand for manufacturing power passed the capacity of the steam plant and purchased power was then used to supply the difference during working periods. No power was purchased after August, 1929, except for the night load, and its purchase was discontinued in February, 1934, when it was established that Diesels could generate it at less cost.

The first Diesel engine, bought in 1928, and run parallel with the steam plant, showed by contrast, such a marked degree of operating economy that it resulted in the purchase of a second engine in 1930. Fuel cost at the steam plant ran from $21 to $24 a day, while the fuel cost at the Diesel plant amounted to only about $5 a day. The load then was: Diesel, 150 kw.; steam, 120 kw.; purchased power, 100 kw.

The Wilcox, Crittenden's power plant, as it stands today, comprises one four-cylinder 240 hp. Fairbanks-Morse Diesel engine driving a 200 kva. alternator with a 10 kw. exciter, and one five-cylinder 525 hp. Diesel of the same make, driving a 447 kva. alternator with a 12½ kw. exciter. A small two-cylinder Wolverine Diesel turning a belt-driven G-E 30 kw. generator is used for the night load to operate the galvanizing shop at night and supply lighting.

The five main departments of the Wilcox, Crittenden plant, comprising its machine shop, brass foundry, iron foundry, galvanizing shop, and forge shop, employ about 260 workers. At

. . . . *And now please turn to page 33*

A Bucyrus Erie shovel operated with an Atlas Imperial Diesel doing its part in excavating some 4,000,000 cubic yards of earth.

DAM DIESELS

OF all the gigantic engineering projects undertaken by men and machinery in modern times, Bonneville Dam comes near to topping the list. Whether one is of a mechanical or a business turn of mind he cannot fail to be impressed and even staggered by the sheer immensity of the vast undertaking.

Begun in October, 1933, as a part of the nation's reconstruction and development program, it will cost over $32,000,000 when completed some time in 1937. Briefly, the project consists in harnessing the Columbia River, the second largest river in America, with a gigantic dam, now under construction, which will cross the river between the states of Washington and Oregon at a point 42 miles east of Portland. The dam is located in the heart of a gorge in the Cascade Mountains, just at the head of tidewater. Army engineers, under whose direction the task is being done, expect ultimately to develop hydro-electric energy to the extent of nearly 600,000 hp. For the present, however, only two power units will be installed. These will develop 86,000 kilowatts when in service.

Diesels are playing a most important part today in the building of Bonneville Dam. On this page is shown an Atlas Diesel operated Bucyrus

Erie shovel dumping rock into a waiting truck. The contractor who owns the shovel states that despite its arduous duty, hour after hour, day after day, it has never broken down since he has been on the job and maintenance costs are practically next to nothing.

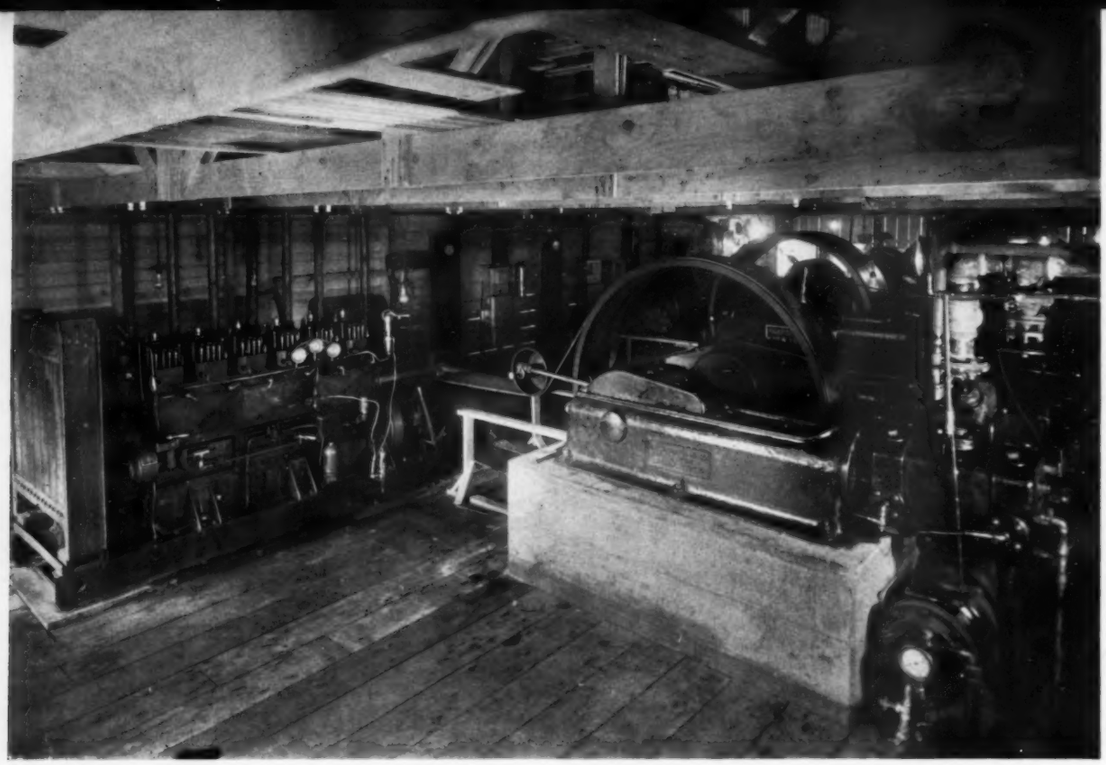
Considering the fact that the excavation work at Bonneville Dam entails the removal of some four million cubic yards of rock and earth, it will be easily seen what a saving in fuel costs, also, is made possible by using Diesels.

Thousands of cubic yards of rock must be drilled and blasted month after month as the work goes on. On the following page is shown a 120 hp. six-cylinder Atlas Imperial Diesel engine which operates an air compressor that supplies drill runners with compressed air for drilling operations. This, too, has an excellent operating record. More and more, as work progresses, Diesel operated units are being placed in service because they save money for the contractors and pay for themselves out of fuel savings.

In addition to power, Bonneville Dam will give deep, slack water navigation economical for motor vessels and barges fifty miles inland to just above The Dalles, Ore., a great wheat growing and shipping center. Boats and barges will be able to cover the distance between Portland and The Dalles over deep water without a single rapids. Eventually ocean vessels will pass through the locks now being built. Shipping interests are at present working to promote the construction of additional dams farther upstream which will give slack water or canal navigation to a distance of 350 miles inland from the sea. Naturally, therefore, Portland welcomes the building of Bonneville Dam as it will improve its position as a marine port. Portland sees in the undertaking the realization of its ambition to develop a greater water-borne commerce, a long-awaited hope.

When the dam is completed it will form a lake 67 miles long. The navigation lock through which ships must pass to enter and leave this inland lake is the largest single lift ever to be built. Consider this. At low water it will raise vessels entering the lock a height of 66 feet. The lock chamber has an inside clearance 500 feet long and 76 feet wide. The gate is as large as the infield of a regulation baseball diamond. The spillway dam is 1,250 feet long and 75 feet high from the gate sills to the roadway atop. This, when completed, will be a wall of concrete

Bonneville Dam as it will look when completed.



Compressed air for the drill runners is furnished by this 120 hp. Atlas Imperial Diesel engine.

nearly a quarter of a mile long. The foundations rest on bedrock 160 feet beneath the surface of the lake.

A phase of the dam which will be of particular interest to those who come to view it will be the fish ladders or elevators which will be constructed to permit the passage of salmon on their way upstream to the spawning grounds. The Royal Chinook, known the world over for its fine color and flavor, must be preserved as the canning industry means millions of dollars to Oregon every year.

Three huge fish ladders will provide means for salmon and other fish to travel over the dam. These ladders will have pools 30 feet wide with a one-foot raise between each one. In addition a double fish-lock elevator will be used to further aid fish on their journey upriver.

Two transcontinental railways, one of them the route of the new Diesel-electric streamlined train, *City of Portland,* pass through the watergrade of the Columbia gorge. Both pass the dam site. Without leaving his train, or his automobile if he travels by the scenic highway, the visitor may look down on the army of men and machinery from vantage points on either side of the river.

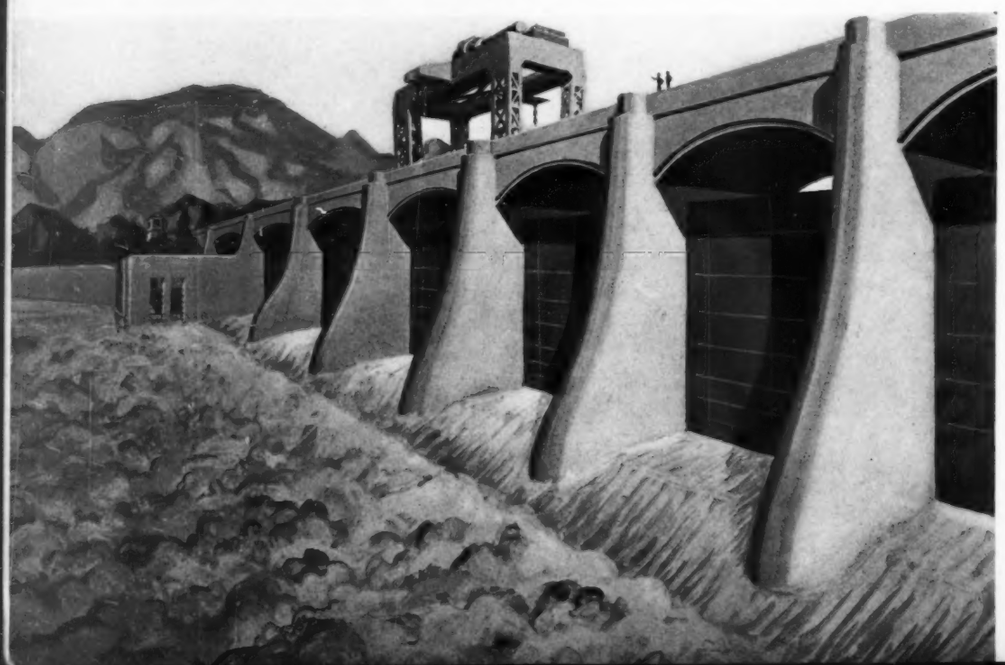
Diesel-powered machinery has a man-size job to perform at Bonneville Dam today and is hanging up new records for dependable, low-cost performance. To indicate the vast scope of the undertaking, here are a few figures based on engineers' estimates, released not long ago by the Portland, Ore., Chamber of Commerce:

Height of dam	94 feet above low water
Power head at ordinary low water	60 feet
Excavation work	4,000,000 cubic yards
Cofferdam fills	300,000 cubic yards
Concrete necessary in construction	1,000,000 cubic yards
Structural steel and castings	15,000 tons
Reinforcing steel	12,000 tons

Estimated principal cost divisions:

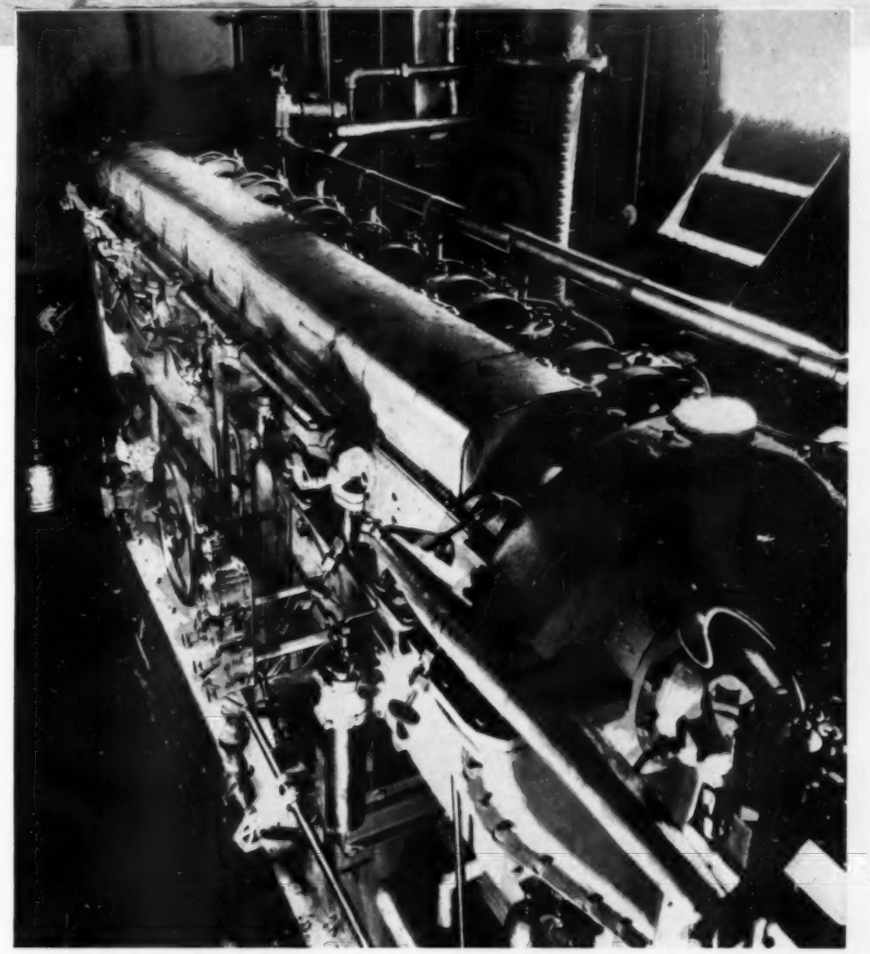
Investigation and designs	$ 300,000
Sea lock and approach canal	4,000,000
Power plant structure	5,400,000
Power plant machinery and equipment	3,100,000
Main dam	9,900,000
Railroad changes	4,500,000
Highway changes	500,000
Fishways	760,000
Land, rights of way, damages	3,500,000

The spillway dam as it will appear when completed. It will be nearly a quarter of a mile long and higher than a six-story office building.



A NEW ALL-STEEL DIESEL TOWBOAT

"George Levingston" Has Unique Arrangement for Altering Draft in Shallow Bayous



TANKER skippers and river boat captains along Gulf ports and Louisiana bayous are tooting whistles and doffing caps to a new and powerful Diesel towboat this season. She is the *George Levingston*, all-steel, electrically welded tug, just placed in service by Wm. T. Burton, Sulphur, La., owner of a large fleet of barges and towboats operating principally out of the port of Lake Charles.

Powered with a six-cylinder, 12½"x 16" Winton Diesel engine developing 350 hp. at 300 rpm., and turning a 71"x 40" propeller, she has a service speed of approximately 10½ miles an hour and is proving highly satisfactory, doing continuous duty 24 hours a day towing oil barges.

She is 65' 9" long, with a beam of 17' 5", and a loaded draft of 8' aft and 6' forward. Her draft, however, can be altered by transferring the fuel and ballast. A 3½"x 2½" transfer pump is used for transferring the fuel forward or aft as required. It also serves the purpose of a fire pump, a deck pump, as well as for use as a bilge pump and for pumping out oil barges. Her operating costs show a decided reduction over the other towboats of the Burton fleet. She was designed and built by the Levingston Ship Building Co.

DIESELS MAKE POSSIBLE A SAVING OF $2,558 IN SIX MONTHS

World's Largest Producer of Bread Wrappers Supplies All Its Power Requirements at .0066c a Kilowatt

The spic and span plant of the Ohio Wax Paper Company, Columbus, Ohio.

At the right — Two batteries of high-speed presses that print the bread wrappers.

The two Winton Diesel generator units that have effected such great savings in power production.

IF the Ohio Wax Paper Company of Columbus, Ohio, the world's largest manufacturer of waxed paper bread wrappers, had continued using purchased power instead of producing its own power with Diesels, its power cost would have been more than twice what it is now. But that, as Kipling says, is another story.

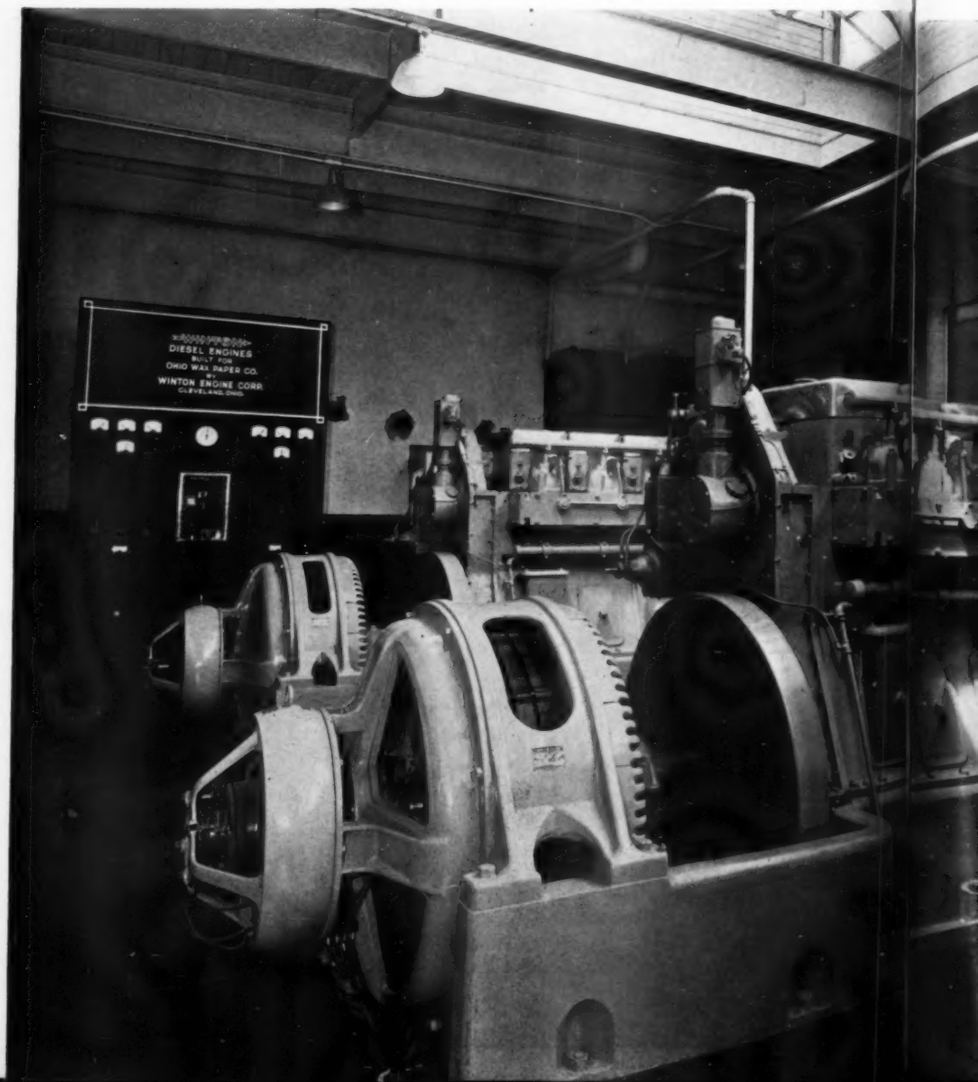
Let G. W. Schaefer, superintendent of the plant, tell it. Here is what he says: "In the last six months we used 307,000 kw. If we had to pay the electric power company, taking 1.5 cents per kw., this amount of power would have cost us $4,605.00. Our cost on this amount of power is $2,046.80, which makes a saving of $2,558.20 for six months, which we think is a very neat saving."

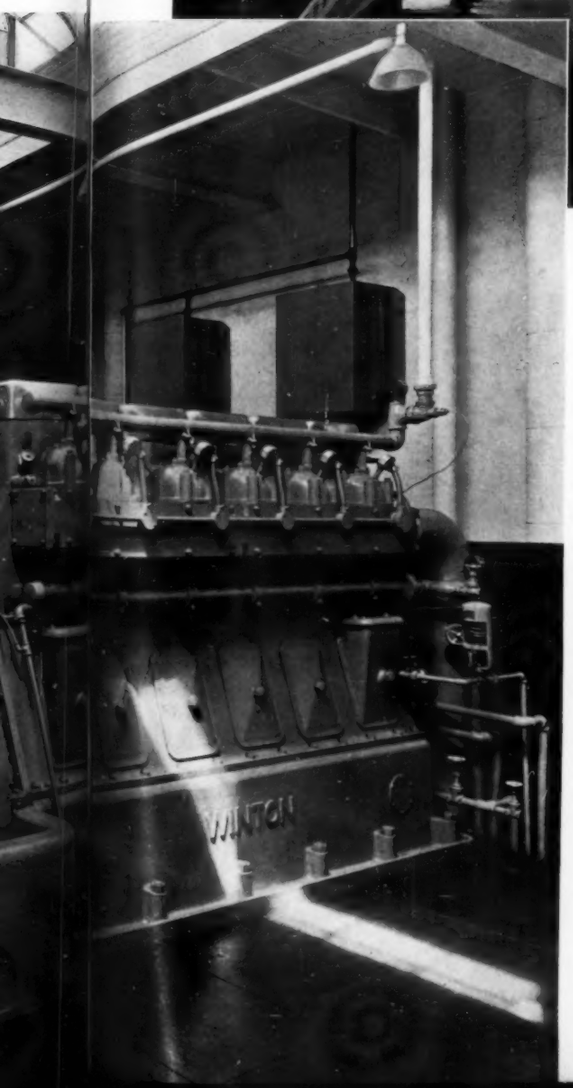
When the Ohio Waxed Paper Company switched to Diesels a year ago it was paying the local power company 1.5 cents a kw. — not an excessive price as far as power company charges go. Nevertheless, with its own Diesel generating plant today, power costs have now been brought down to as low as .66 cent a kw.—a saving of more than 100 per cent.

Engineering experts consider this power plant one of the finest of its kind in the country. Certainly the operating figures and the high degree of satisfaction it is giving its owners leave no room for any doubt. One of the biggest advantages has been the absolute control of machine speeds during manufacturing processes, an important factor in the making of waxed paper bread wrappings, where constant speed of the machine rolls is required. Running at the rate of nearly a mile a minute, the color presses that do the printing must not vary from their prescribed speeds. Hence the need of accurate control.

The new Diesel plant, installed last August, comprises two four-cycle Winton engines, one six-cylinder model of 250 hp. direct-connected to a 166 kw. G-E alternator, and one four-cylinder model of 165 hp. direct-connected to a 110 kw. G-E alternator, each with direct-connected exciters. In each assembly the engine and generator are mounted on a common base which insures perfect alignment of moving parts and simplifies installation problems.

Other outstanding features are full pressure lubrication, electric synchronizing governors, and automatic stops to guard against possible failure of either lubricating oil or cooling water.





Viewed from an engineering standpoint, the installation is extraordinary for compactness, flexbility in operation, and generally fine appearance, as the photograph here proves.

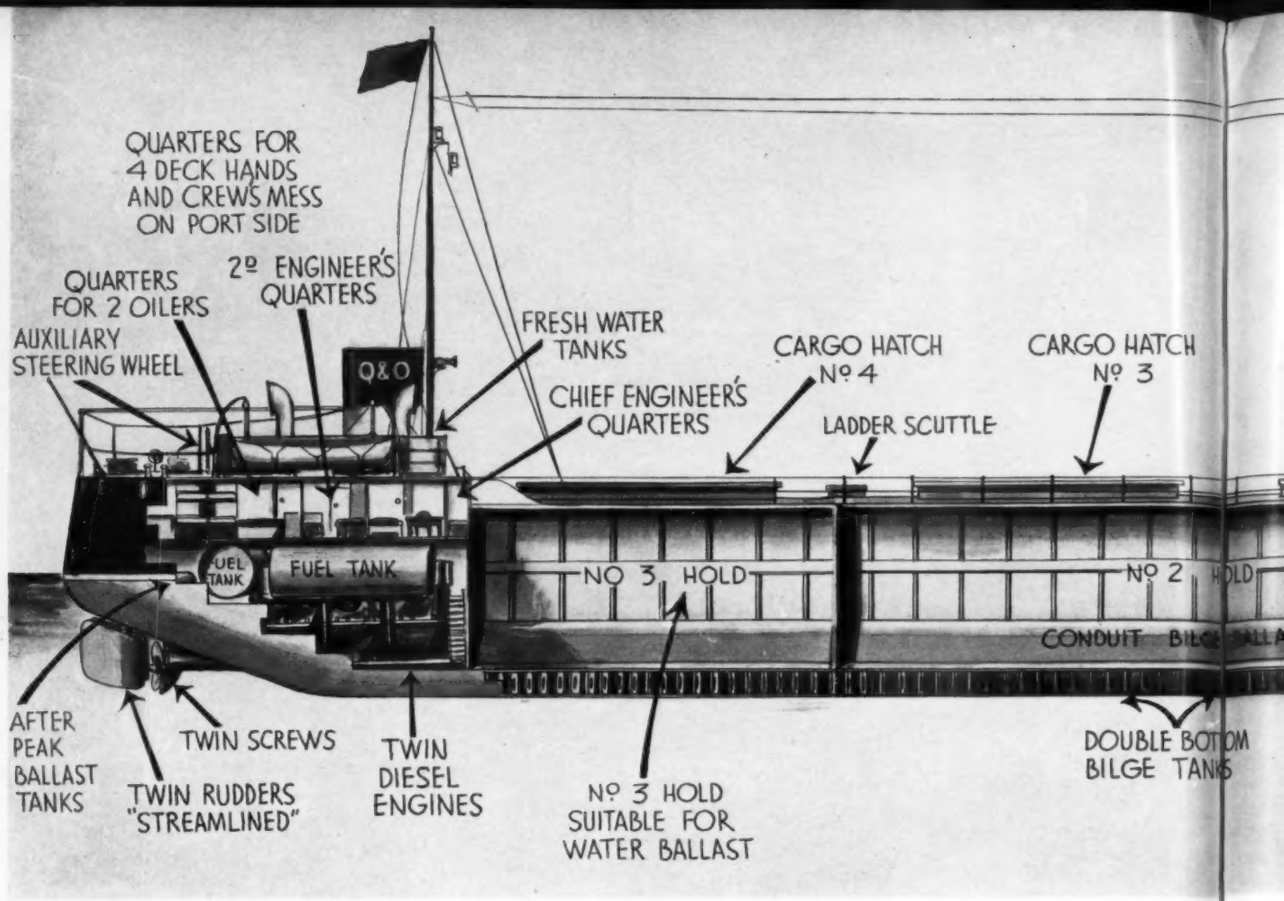
The plant employs what is known as a closed water cooling system, consisting of a circulation of hard water for the purpose of cooling soft water which is circulated through the engines. The raw water circulation drains from a cooling tower located on the roof above the engines, to an aerated storage tank. From this tank motor-driven centrifugal pumps pass the water first through oil coolers and thence to heat exchangers, returning the water to the top of the tower for cooling. Motor-driven centrifugal pumps circulate the soft water through the heat exchangers where it is cooled and then passed to the engines. There is continuous circulation of both raw water and soft water. Double circulating pumps, integral with the engines, circulate the lubricating oil through filters and coolers before returning it to the engines. Starting is by air from storage tanks supplied by an air compressor.

Fuel oil is stored in a 15,000-gallon tank located in close proximity to a railroad siding. From this tank a remote controlled, motor-driven, rotor pump supplies the day tanks with fuel oil from which the primary pumps located on the engine receive their supply.

Established in 1912, the Ohio Waxed Paper Company has devoted itself exclusively to the manufacture of waxed bread-wrapping paper. In Ohio it is mandatory to wrap bread. This sanitary requirement gave the Ohio Waxed Paper Company its opportunity – an opportunity it has made the best of in every way – for the improvement of its product, the improvement of its manufacturing methods, and, more recently, the selection of a power plant whose great economy made it possible to keep down manufacturing costs in face of rising wages and increased cost of raw materials.

When the various state department rulings went into effect little importance was placed on the sealing quality of bread wrappers. The average bakery put out string-tied packages. The Ohio Waxed Paper Company, however, saw the need of a better method of sealing loaves of bread, and from the start, pioneered in producing a better type of wrapper. With the innovation of ready sliced bread a few years ago it met the demand with a special type of waxed wrapper which it named Sno-Wite-Art-Glos. This, in addition to the qualifi cations of its regular product, had special keeping qualities which enabled baking companies to retain the original flavor of their sliced bread for a longer period, as well as insuring delivery to the consumer, tightly sealed against air and moisture, and attractively packaged.

. . . . *And now please turn to page 35*



DIESELS GO INTO THE P

By HARRY A. LAIRD
Traffic Manager, "Chicago Tribune"

CONVINCED that motor ships are the only answer to economical water transportation, the Chicago *Tribune* has just placed in service another Diesel pulpwood and newsprint carrier, of welded steel construction with a cargo capacity 50 per cent greater than the canal-size vessels operating on the Great Lakes. It is the largest all-welded ship in existence.

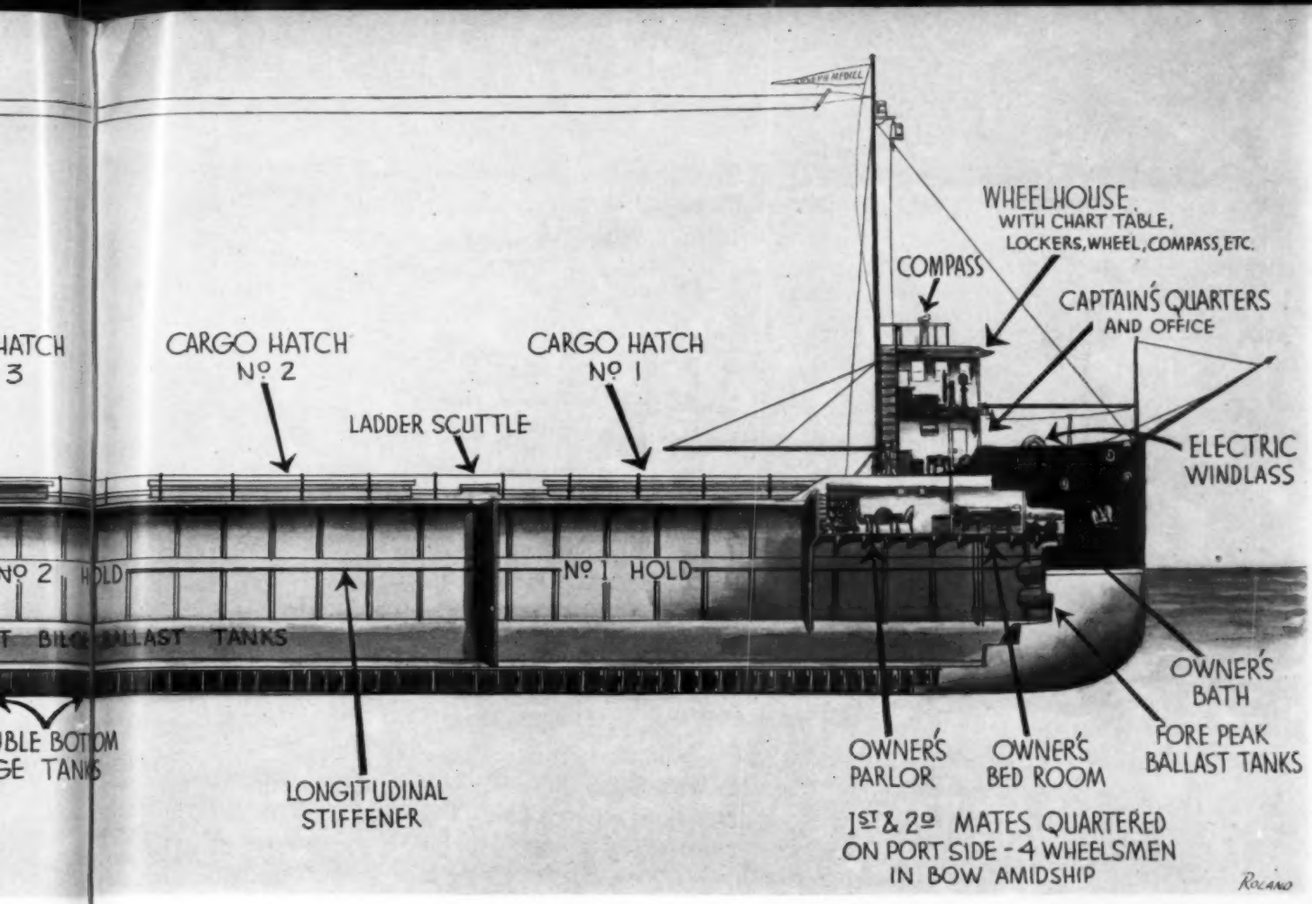
The *Joseph Medill* is the result of the *Tribune's* experience with its Diesel-engined newsprint carrier, the *Chicago Tribune,* and a close study of the advantages and disadvantages of bulk freighters and between-deck vessels. Statistics relating to other motor ships as well as steamships were studied, not only from a standpoint of relative efficiency, but also from the standpoint of weight of the power plant and the fuel supply that must be carried.

Part of the route covered by these vessels between the timber limits on the north shore of the St. Lawrence River, 200 miles east of Quebec, and the paper mill at Thorold, Ontario, is deep water, while the remainder of the route takes in the entire length of the comparatively narrow and shallow St. Lawrence Canal system. Hence, buoyancy of hull, and maximum cargo space were essentials which had to be embodied in its design. A further objective was a hull design that would take full advantage of the limited dimensions of the canals and locks.

With ships engaged in the Great Lakes service there is danger of a section of the bilge receiving damage when the hull touches the canal side or dock wall, so what is known as the Conduit bilge system has been employed with the object of diminishing this danger.

Naval architects, experienced in designing special forms of hulls, were invited to submit plans. The importance of carefully planning the location of ballast tanks so as not to take up too much valuable cargo space, and the difficulties with the ship's bilges, which in ordinary freighters seriously curtail newsprint stowage, was explained to them in detail.

The plans of Walter Lambert, of Lambert and



HE PUBLISHING BUSINESS

German, Montreal, were selected as the most practicable. The Conduit bilge system was an arrangement originated by this firm.

Objectionable extra weight was overcome by using Diesels in place of heavier steam engines and by welded construction throughout. It is believed that the *Joseph Medill* represents the most efficient class of cargo carrier on the Great Lakes. The vessel will carry 1,375 cords of pulpwood, as compared with the ordinary canal type vessel of only 1,000 cords capacity. Its newsprint capacity is 2,400 tons. It has the maximum possible deadweight capacity within the imposed limits of length, beam and draft. The power plant is located aft.

Two six-cylinder, single-acting, two-stroke, airless injection Diesel engines, each developing 500 bhp., running at 353 rpm., give the *Joseph Medill* a speed of 9½ miles per hour with a full cargo. Each unit is of the trunk-piston, direct-reversible type.

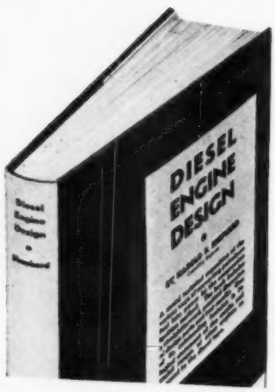
The designers decided that steam should be absent in the ship and electricity is used, not only for the steering gear, windlass and winches, but in the galley for cooking and refrigerating. Electric radiators supply heat in the living quarters of the captain and crew. Even water in the bathrooms is heated electrically. Two four-cycle Diesel engines running at 1,000 rpm., coupled to 58 kw. dynamos, furnish all the electricity.

The dimensions of the vessel when loaded are the extreme limit permitted by the lock chambers through which it must pass westbound with a cargo of pulpwood. The *Joseph Medill* is 259′ overall and 43′ 10″ beam. Its draft, loaded, is just fourteen feet.

The new ship has two balanced, streamlined rudders and a cruiser stern. There are three cargo holds and four hatches, the double bottom being divided into two tanks. These are used for carrying fuel. Additional fuel can be accommodated in the after peak, which is normally used for water ballast. Above the after peak tank is another fuel bunker. There is also a fore peak water ballast tank. Transverse framing is employed throughout the ship.

The Chicago *Tribune* is justly proud of the performance of the new *Joseph Medill*. The choice of Diesels solved a "weighty" problem. Their comparative lightness contributed a valuable factor in the success of the vessel's design.

The only book in the English language which treats completely the design of all parts of the fuel injection apparatus and combustion chambers in Diesel engines—



DIESEL ENGINE DESIGN

By **HAROLD F. SHEPHERD**

Consulting Engineer, Member American Society of Mechanical Engineers.

227 Pages, 6x9, $3.50

TABLE OF CONTENTS

Chapter I —Historical

Chapter II —Combustion

Chapter III —The Influence of the Combustion-Chamber Walls

Chapter IV —The Fuel Nozzle

Chapter V —The Fuel Pump

Chapter VI —Governing

Chapter VII —Cylinder Head, Valves and Valve Gear, Starting

Chapter VIII—Two-cycle Engines

Chapter IX —Injection of Gaseous Fuel

Chapter X —Bearings and Lubrication—Pistons and Piston Rings

Chapter XI —The Indicator Diagram

Chapter XII —The Inertia of Reciprocating Parts and Balancing

Chapter XIII—The Flywheel

Appendix —Reducing Calculations in Designing Crankshaft Members

"DIESEL ENGINE DESIGN" will be indispensable to the engineer who needs a sound technical exposition of the various ways of converting petroleum fuel into power by the compression ignition method. Useful alike to builders, purchasers, and users of Diesel engines, it is not a mere recapitulation of the list of existing models, but presents a straightforward, practical discussion of design parts and test results. One of its outstanding features is its logical statement of the merits and useful ranges of other engines as opposed to the Diesel type.

This new book deals specifically with such subjects as combustion, the influence of the combustion-chamber walls, the fuel nozzle and pump, governing, cylinder heads, valves and valvegear, the injection of gaseous fuel, bearings and lubrication, pistons and piston rings, two- and four-cycle engines, inertia, the flywheel, and all other important factors in the design of Diesel engines. The Diesel engineer's objective is not so much to seek out the best fuels, but rather so to develop his product that it will burn a somewhat broad range of those refinery products which are in least demand for other purposes. To this end the studies on combustion-chamber gas and wall temperatures in this book are exceptionally valuable in connection with the developments which will inevitably result from more general practice of fuel testing.

The author, H. F. Shepherd, is an authority on the design and operation of Diesel engines. He has for many years been active in their development, and is the inventor of numerous special features and improvements well known to engineers in this field.

DIESEL ENGINES, INC., ***Book Dept.,*** **2 West 45th St., New York, N. Y.**

Enclosed please find $3.50 for one copy of the book, "Diesel Engine Design"

NAME_____
(Please Print)

ADDRESS_____

A CONNECTICUT YANKEE ENDORSES DIESELS

. . . . *Continued from page 23* . . . .

present the plant is running close to capacity. Yet the load varies greatly, so much so in fact, that the power demand on purchased electricity would be on many days, far in excess of what could be used.

With Diesels as the main source of power, the plant possesses the utmost flexibility in operating in addition, of course, to economy. An interesting result of the change to Diesels during the last seven years is that now the fuel cost for the Diesel plant is about $12 a day — about one-half that of the steam plant which generated only one-third of the load.

Only one man's time is required to attend the engines, and part of it is taken up with other duties. The figure of 1.3 cents a kwh. which the Wilcox, Crittenden Company's 1934 cost figures show, includes not only the cost for fuel and lubricating oil, but 80 per cent of the engineer's wages, the expense of overhauling one of the engines, the taxes on the engines and their buildings, depreciation on engines and building, and fire and compensation insurance.

The Wilcox, Crittenden trademark — a lighthouse shedding its rays on the word "DEPENDABLE" — a trademark known wherever yachtsmen and boat-owners gather, is also expressive of its Diesel engines. Streams may run dry, steam plants may burn down (as two of them did in the company's history) and electric power transmission may be interrupted by vagaries of the weather, but Wilcox, Crittenden & Company will continue to grind out its own power at the old stand as it did in the beginning — but it will do it *with Diesels.* They've proved DEPENDABLE.

MAMMOTH TRUCKING SYSTEM WILL BE NATION-WIDE

Chicago, August 22 — A nation-wide system of motor freight lines which will use many Diesel powered trucks is now in process of formation by J. L. Keeshin of the Keeshin Motor Express Company, Chicago, and John Hertz of Lehman Brothers, and now an official of the Fifth Avenue Coach Company.

The new enterprise, with Chicago as the center of its activities, will radiate in all directions main lines which will reach out to key destination cities. From these arteries it is planned to give service to many smaller communities which at present lack regular direct transportation service. The principal activity, however, will be long-distance hauling.

MODEL QUARRY IS DIESEL OPERATED

. . . . *Continued from page 12* . . . .

are interlocked through magnetic locks and push-button control so that the failure of one unit will automatically stop those preceding it. The plant is of fireproof construction throughout. The 43 G-E motors installed in the plant have a combined rating of over 2,000 hp., but at full capacity only 1,800 hp. is actually required to operate the plant. Carefully checked estimates place the power factor obtained as high as 78 per cent.

The entire plant, with the exception of the Diesel engine power plant, was designed by the Traylor Engineering and Manufacturing Company in collaboration with the Lyons & Slattery Company, joint owners of the Hudson River Stone Corporation with O'Brien Bros. Sand & Gravel Corporation. The engineers of the Hudson River Stone Corporation working with the McIntosh & Seymour Co. and the General Electric Company handled the matters of the generating plant and power distribution.

The power house is a concrete structure 90′ x 42′ and 25′ in height. In addition to the engines it houses the central switchboards which control the distribution of power to all parts of the plant. Its strategic position between a railroad siding and the river bank, enable the three 20,000-gallon fuel oil storage tanks to be filled either from oil tankers, tank cars, or trucks.

The power plant equipment consists, at present, of three six-cylinder McIntosh & Seymour four-cycle solid-injection Diesel engines rated at 660 hp. each, operating at 300 rpm. Each is direct connected to a 500 kw. generator having a directly attached 14 kw. 125-volt, d.c. exciter. Space is reserved for a fourth engine to be installed as soon as the operating demand of the plant warrants its addition. The generators produce three-phase, sixty-cycle, alternating current at 2,300 volts. All power lines run from the switchboard to points at which they feed the motors through underground conduits.

A complete water-cooling system for the Diesel engines is provided by De Laval 4-inch and 5-inch centrifugal water supply pumps, direct connected to water supply storage tanks and a water cooling tower. Well water, of which there is a plentiful supply, is used for cooling the engines. Provision is also made for using river water in emergency, using the two Goulds one- and two-stage 8-inch centrifugal pumps which supply water for washing the crushed stone.

When the question of power needs was under consideration the engineers spent many hours in estimating and figuring.

It did not take long for the plant engineers to demonstrate to the corporation that electricity could be generated with Diesel engines at a much lower cost than purchasing it from the power company. Today it generates all its power at a total cost of 1¼c a kwh.

There was one other cogent reason why Diesels offered advantages equally as valuable as economy. Transmission lines exposed to the elements for long distances are subject to interruption by storms, etc. If these lines are broken the possible interruption of service would constitute a very serious matter, involving delay and unnecessary expense.

Air for the compressed air drills used in the quarrying of the stone is furnished by three Chicago Pneumatic 1,200 cubic foot capacity air-compressors, each direct connected to a 165 hp. Diesel engine of the same make.

A crew of three operates the engine room with its three main Diesels supplying all electrical power needs, and the three smaller Diesels that operate the air compressors for the drills. The crew comprises one Diesel engineer, one oiler, and one man at the switchboard. The plant runs eight hours a day. Special attention was paid to safety features in designing the plant.

DIESELS MAKE POSSIBLE A SAVING OF $2,538

. . . . *Continued from page 29* . . . .

Eye appeal plays a big part in bakery sales, and this, the Ohio Wax Paper Company recognizes. Not only does the company provide its bakery customers with strong protective wrappers, but it goes a step farther by helping each bakery to sell more bread by individualizing its loaves with a wrapper whose color and design stand out most prominently.

To prepare suitable designs for its customers, the company maintains a complete art and stereotype department which creates distinctive wrappers and then produces the plates necessary for printing them. The printing process is so long and continuous that the plates must be nickel-plated to resist wear.

The paper used in making the wrappers comes in huge rolls weighing from 800 to 1,200 pounds. In width they range from 56 to 72 inches. Two 52-000-pound tanks of wax are used each week. The company mixes and grinds all its own inks, the mixing department working day and night the year around including Sundays. The wax paper, on account of its high transparency, requires inks of the greatest tinctorial strength. About three-quarters of a ton of ink is used daily.

In the printing press room are two batteries of modern color presses, one battery consisting of four three-color presses, and the other consisting of five two-color presses. These presses run as fast as newspaper presses. In one week alone they could print a roll of paper 18 inches wide and 33,000 miles long, or approximately one and one-third times the distance around the world at the equator.

From the printing department the paper rolls are transferred to the waxing department which contains four enormous waxing machines. These machines run the paper through waxing vats filled with wax heated to 180°. From there the paper is run through ice-cold water which chills the wax, making it more transparent.

From here the rolls go to the re-wind machines which cut and re-wind the waxed wrappers into 10-inch rolls ready for shipment to the individual bakeries. Most of the wrappers are shipped out in rolls, but a small proportion of the output is delivered in flat sheets to some bakeries who wrap their bread by hand. About one-sixth of the total production is shipped in the form of plain waxed paper without any imprinting.

The Ohio Waxed Paper Company's plant is equipped with the most modern kind of refrigeration machinery. The refrigerating units comprise one ice-making machine with a capacity of 30 tons of ice every 24 hours and one with a capacity of 15 tons. These machines are used for general refrigeration purposes and for chilling the water in the four waxing machines. Shipments average more than a million pounds of bread wrappers every month. The plant ships its products direct to bakeries in all parts of the United States.

The processing of the paper requires a constant speed of the machine rolls. Each of the engines is fitted with a special Woodward governor, entirely self-contained, which comprises an extremely sensitive centrifugal governor, a pilot valve and a hydraulic element to move the governing mechanism. Governing is obtained through the shifting of a wedge between the push rod and the rocker arm which lifts each fuel needle valve. Even with load changes as high as 50 per cent the governors hold the speed within 0.2 cycle of normal. Accurate and extremely sensitive, they furnish the exacting degree of control necessary to the fine gradations of speeds required in the processing.

So diverse are the applications of Diesels in industry today that it is hard to find an industry where its influence is not felt. The Ohio Wax Paper Company is another instance where Diesels not only do the work cheaper — but BETTER!

CORRECTIONS

Through a regrettable misunderstanding, an error crept into the description of the Ipswich, Massachusetts, municipal Diesel plant, which appeared on pages 20 and 21 of our August issue.

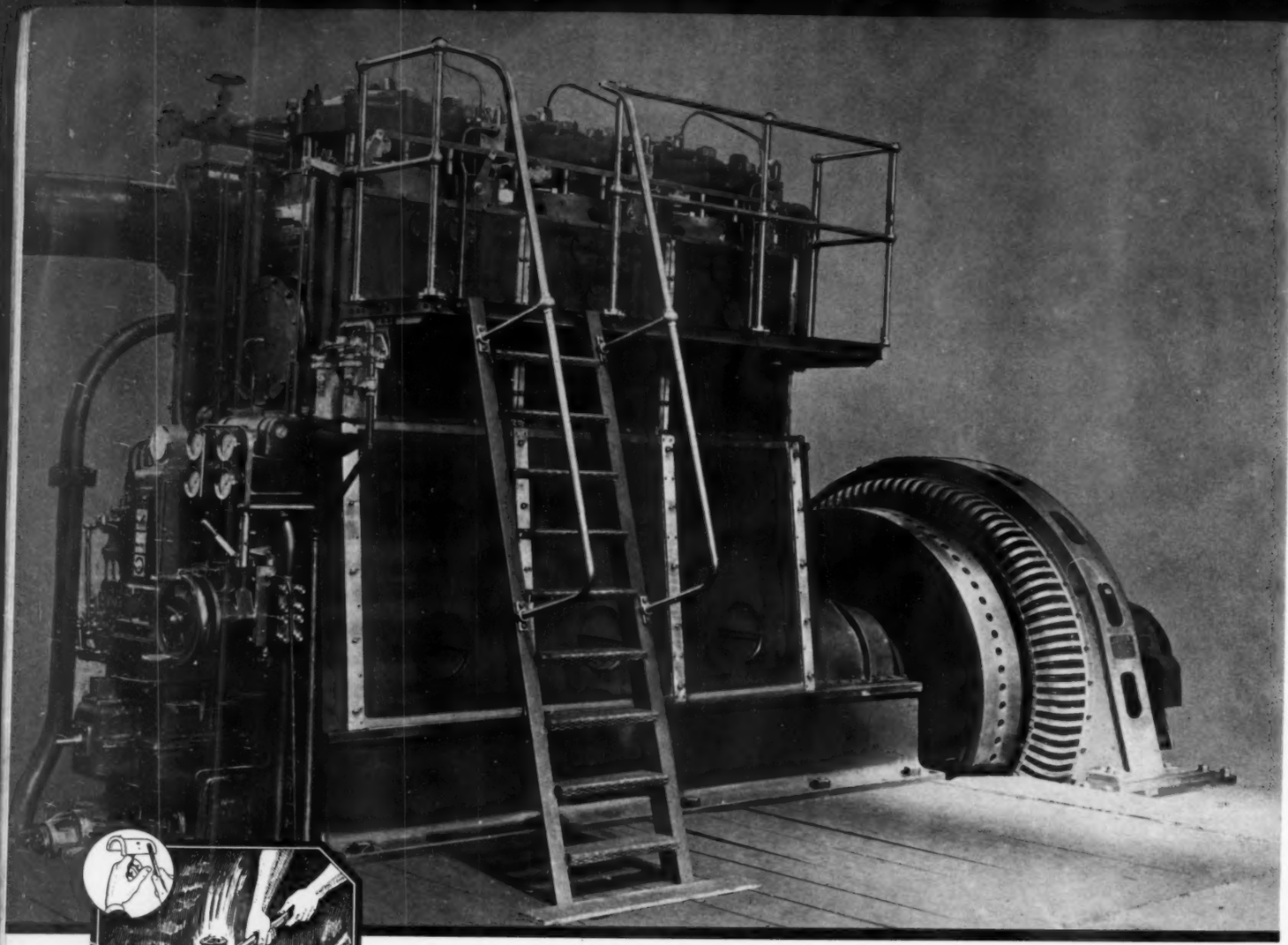
The fifth paragraph describing the generator equipment should have referred in all instances to Fairbanks, Morse generators and not G-E generators.

The actual facts are that all three engines and all three generators in this plant were manufactured and supplied by Fairbanks, Morse & Company.

On pages 20 and 21 of our July issue, we published a description of the Southern Pacific Railway's method of handling bulk cement on the Colorado River Aqueduct project. It is a matter of sincere regret to the editor that the correspondent who supplied this article was in error in stating that four of the trucks were Diesel equipped.

We have been informed by Mr. L. B. Young, Vice-President of the Pacific Motor Trucking Company, that all of the trucks on this particular project are still equipped with their original gasoline engines.

Our sincere apologies are extended to Mr. Young for this inadvertent error and for the inconveniences to which the publishing of this article has subjected him.



Three single-acting, trunk piston, two-cycle HAMILTON - M.A.N. Diesel engines, 21½" x 27½", 240 rpm. 750 kw. Built by HOOVEN, OWENS, RENTSCHLER CO., Hamilton, Ohio, for the Imperial Irrigation District of California for installation in their Brawley plant. These engines are equipped with Satco* bearings.

DAILY the Diesel engine gives a convincing demonstration of its versatility. Afloat and ashore, Diesel installations increase in number as proof of the Diesel's economical performance becomes more widely known.

Here we see a ship sailing the high seas; there we find a tractor battling through a swamp; on the highways, heavy trucks carrying heavier payloads; on the rails, swift new trains giving the traveling public a new deal — all powered by Diesel engines.

It has been the job of American Bearing Corporation to help insure steady, trouble-free operation of Diesel engines in many varied fields, by designing and fabricating the several types of bearings required.

Our bearings of Satco* metal are of special interest to builders and operators of Diesel engines. Satco* possesses all the important requisites of a modern bearing metal: adequate resistance to crushing stresses; a low frictional coefficient; a relatively high melting point; resistance to extraordinary deformation; ability to adapt itself to the ordinary play of the shaft.

We invite your inquiries on all matters pertaining to bearings

*A patented alloy manufactured by National Lead Company
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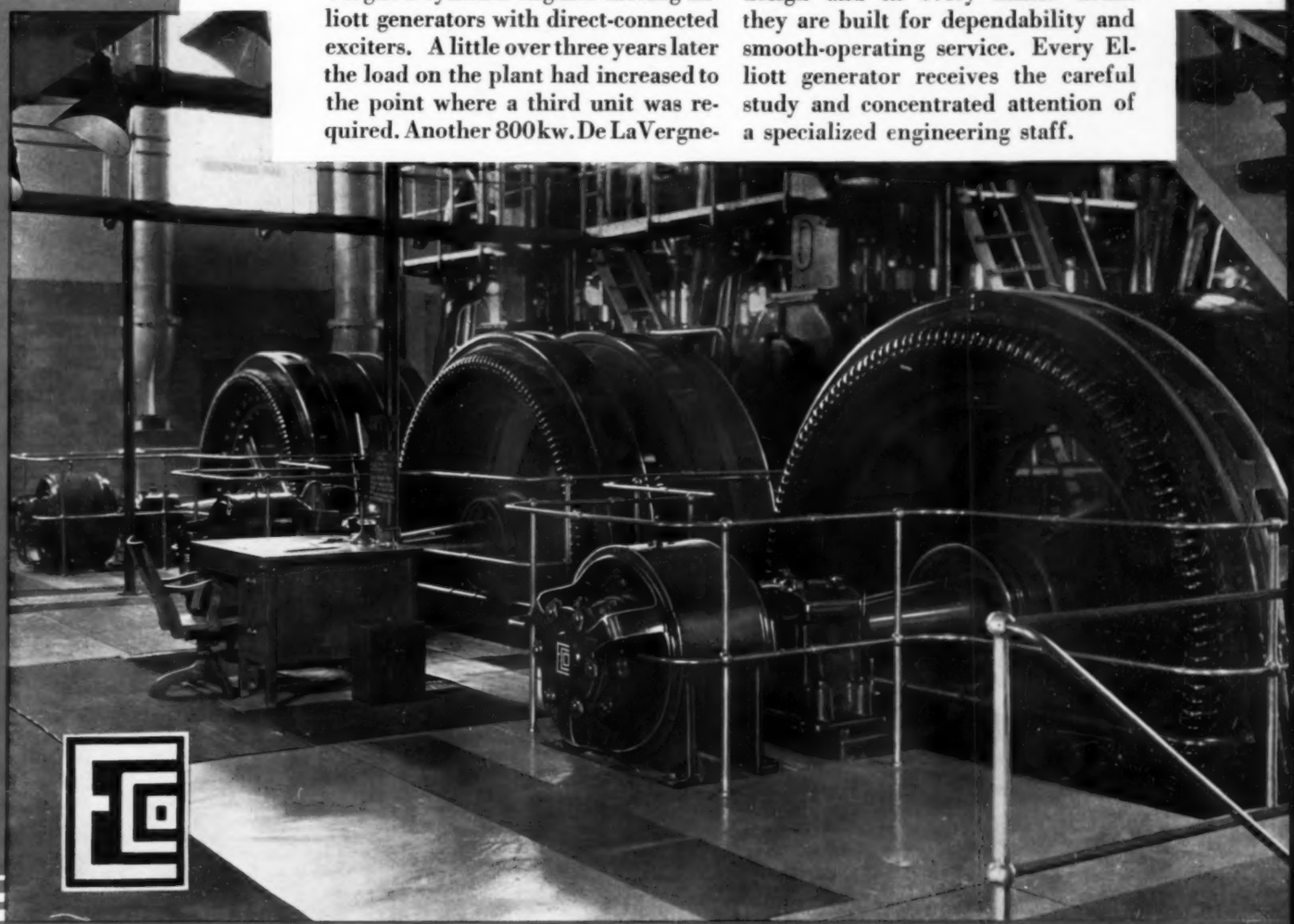
Now...the third
ELLIOTT GENERATOR
for Grand Haven, Michigan

2400-k.w. of sturdy, dependable, smooth-running Elliott generators, in three units, driven by De LaVergne engines, are serving the Grand Haven, Michigan, municipal plant faithfully and well.

The City of Grand Haven, Michigan, is well pleased with its Diesel engine municipal power plant. For the five years of its existence, the plant has made a fine record. Not a cent of indebtedness stands against it. All machinery is paid for, rates have been lowered, and donations made to various city needs.

In 1931 the new Diesel engine plant was started with two 800 kw. De LaVergne 6-cylinder engines driving Elliott generators with direct-connected exciters. A little over three years later the load on the plant had increased to the point where a third unit was required. Another 800kw. De LaVergne-Elliott unit was installed. The first two units had operated so satisfactorily that no other choice could have been made. The units were all selected on the basis of dependability as a primary consideration, and the generators and exciters on the basis of high efficiency and rugged cast iron frame construction.

Elliott generators are engineered to the Diesels they are to serve. In broad design and in every minor detail they are built for dependability and smooth-operating service. Every Elliott generator receives the careful study and concentrated attention of a specialized engineering staff.



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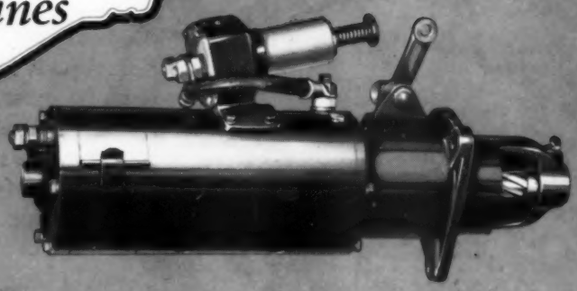
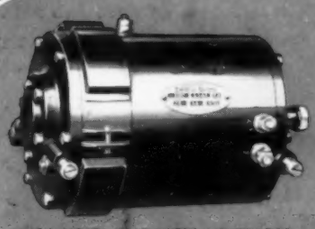
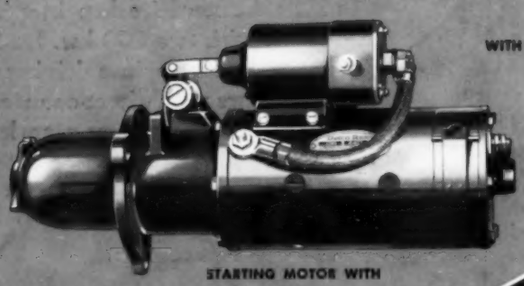


STARTING MOTOR
WITH MANUAL STARTING SWITCH

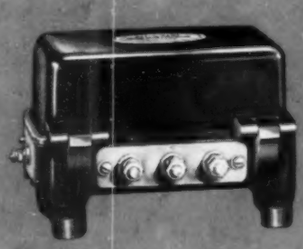


24 VOLT—14 AMPERE GENERATOR



STARTING MOTOR WITH
REMOTE CONTROL SOLENOID STARTING SWITCH

24 VOLT—10 AMPERE GENERATOR



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UNITED SERVICE MOTORS

OVERSEAS MOTOR SERVICE CORPORATION

Adequate service and parts for these and other Delco-Remy units are available in the United States and Canada through Branches and Distributors of United Motors Service—and in foreign countries through Overseas Motor Service Corporation.

After years of experience in the design and manufacture of passenger car and heavy-duty truck and motor coach equipment, Delco-Remy offers a complete line of electrical units—including Generators, Starting Motors and Switches, Current and Voltage Regulators—for automotive Diesel engines.

GENERATORS are available in sizes from 6 to 40 amperes for 12, 24 and 32 volt systems. All are full ball bearing and have their output controlled by a current and voltage regulator for protection to both the generator and the battery and to insure keeping the battery fully charged.

STARTING MOTORS are of ample size, with *three* large bronze bearings that are *oil wick lubricated*, and are equipped with a special heavy-duty drive for the greater torque and r.p.m. required to crank a Diesel engine. The pinion is positively engaged with the flywheel before power is applied, and automatically disengages when the engine starts.

STARTING SWITCHES have ample size contacts made of non-fusible alloys. Wide openings between the contacts, together with the quick-break action, eliminate arcing and give the contacts longer life.

All of the units are built to Delco-Remy standards of precision and workmanship, and to withstand the severe service on a Diesel engine.

We have prepared a booklet on Delco-Remy electrical equipment for Diesel engines which will be of particular interest to users of Diesel units in truck and motor coach service or those contemplating the purchase of automotive Diesel equipment. Write for a free copy.

DELCO-REMY CORPORATION
ANDERSON, INDIANA

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